Utah Department of Transportation

Supplemental Drawings for

2008 Standard Specifications

FOR ROAD AND BRIDGE CONSTRUCTION

Issued December 3, 2008

Memorandum UTAH DEPARTMENT OF TRANSPORTATION

DATE: December 3, 2008

TO: Holders of Hard Copy of Standard Drawings

FROM: Barry Axelrod, CDT
Standards and Specifications

SUBJECT: Supplemental Drawing Distribution, dated December 3, 2008

Applicable files for the change are attached. Maintain these files as a supplemental update to the UDOT Standard Drawings, 2008 Edition. No pages are to be removed or replaced in the basic book, electronic or hard copy.

If you are in need of electronic copies of any Standard or Supplemental Drawing please refer to the Standards and Specifications Web site at http://www.udot.utah.gov/go/standardsandspecifications. From there select the **2008 Standards** subtopic.

If you have any questions or problems with the electronic files contact me at 801-964-4570, 801-631-8828 (cell), or by email at **baxelrod@utah.gov.**

Attachments

STANDARD DRAWINGS INDEX (Supplemental Issue #4, December 3, 2008)
UTAH DEPARTMENT OF TRANSPORTATION

NUMBER	TITLE	CURRENT DATE
	Advanced Traffic Management System (AT)	
AT 1	Legend Sheet	01/01/08
AT 2	Ramp Meter Details	01/01/08
AT 3A	Ramp Meter Sign Panel	01/01/08
AT 3B	Ramp Meter Sign Panel	01/01/08
AT 4	Typical Ramp Meter Signal Head Mounting	01/01/08
AT 5	Ramp Meter Loop Installation	01/01/08
AT 6	Conduit Details	01/01/08
AT 7	Polymer-Concrete Junction Box Details	01/01/08
AT 8	ATMS Cabinet	01/01/08
AT 9	ATMS Cabinet Disconnect And Transformer Frame	01/01/08
AT 10A	CCTV Mounting Details	01/01/08
AT 10B	CCTV Settings	01/01/08
AT 11	CCTV Pole and NID Mounting Details	01/01/08
AT 12	CCTV Pole Foundations For CCTV Pole	01/01/08
AT 13	HAR Pole Detail	01/01/08
AT 14	Weigh In Motion Piezo Details	01/01/08
AT 15	RWIS Site And Foundation Details	01/01/08
AT 16	RWIS Tower Base And Service Pad Layout	01/01/08
AT 17	Ground Rod Installation And Tower Grounding	01/01/08
AT 18	TMS Detection Zone Layout	01/01/08
	Barriers (BA)	
BA 1A	Precast Concrete Full Barrier Standard Section (New Jersey Shape)	01/01/08
BA 1B	Precast Concrete Full Barrier Standard Section (New Jersey Shape)	01/01/08
BA 1C	Precast Concrete Barrier Terminal For Speed $\leq$ 40 MPH (New Jersey Shape)	01/01/08
BA 1D	Precast Concrete Full Section Median Installation (New Jersey Shape)	**10/30/08**
BA 1E	Precast Concrete Full Section Shoulder Applications (New Jersey Shape)	**10/30/08**
BA 2	Precast Concrete Half Barrier Standard Section (New Jersey Shape)	01/01/08
BA 3A1	Cast In Place Constant Slope Barrier	01/01/08
BA 3A2	Cast In Place Constant Slope Barrier	01/01/08
BA 3B1	Precast Concrete Constant Slope Barrier	**10/30/08**
BA 3B2	Precast Concrete Constant Slope Barrier	**10/30/08**
BA 3B3	Precast Concrete Constant Slope Transition Section For Crash Cushion And W-Beam Guardrail	**10/30/08**
BA 3C	Not Used	
BA 4A	W-Beam Guardrail Hardware	01/01/08
BA 4B	W-Beam Guardrail Transition	01/01/08
BA 4C	W-Beam Guardrail Transition Curb Section	01/01/08
BA 4D	W-Beam Guardrail Anchor Type I	01/01/08
BA 4E1	W-Beam Guardrail Installations	**10/30/08**

BA 4E2	W-Beam Guardrail Installations	**10/30/08**
BA 4F	W-Beam Guardrail Typicals Divided Roadways	01/01/08
BA 4G	W-Beam Guardrail Typical Multilane Arterial	01/01/08
BA 4H	W-Beam Guardrail Typical 2 Lane 2 Way	01/01/08
BA 4I	W-Beam Guardrail Buried In Backslope Terminal	01/01/08
BA 4J	W-Beam Guardrail Buried In Backslope Terminal With Rub Rail	01/01/08
BA 4K	W-Beam Guardrail Buried In Backslope Terminal Anchor	01/01/08
BA 4L	W-Beam Guardrail Curve Details	**10/30/08**
BA 4M	W-Beam Guardrail Nested Guardrail 12’ 6” Span	01/01/08
BA 4N	W-Beam Guardrail Nested Guardrail 18’ 9” Span	01/01/08
BA 4O	W-Beam Guardrail Nested Guardrail 25’ Span	01/01/08
BA 4P	W-Beam Guardrail With Precast Barrier For Span > 25’	01/01/08
BA 4Q	Not Used	
BA 4R	W-Beam Median Barrier Transition	01/01/08
BA 4S1	W-Beam Guardrail With Modified Curb and Curb and Gutter	01/01/08
BA 4S2	W-Beam Guardrail With Curb and Gutter ≥ 5”	01/01/08

Catch Basins And Cleanouts (CB)

CB 1	Curb and Gutter Inlet	01/01/08
CB 2	Open Curb Inlet	01/01/08
CB 3	Shallow Catch Basin	01/01/08
CB 4	Open Curb Shallow Catch Basin	01/01/08
CB 5A	Standard Catch Basin and Cleanout Box	01/01/08
CB 5B	Standard Catch Basin and Cleanout Box Section	01/01/08
CB 6A	Drop Inlet Type “A”	01/01/08
CB 6B	Berm Apron With Drop Inlet Type “A”	01/01/08
CB 7A	Drop Inlet Type “B”	01/01/08
CB 7B	Normal Apron With Drop Inlet Type “B”	01/01/08
CB 8A	Double Catch Basin	01/01/08
CB 8B	Double Catch Basin	01/01/08
CB 9A	Standard Catch Basin And Cleanout Box Situation And Layout	01/01/08
CB 9B	Standard Catch Basin And Cleanout Box Section Details	01/01/08
CB 9C	Standard Catch Basin And Cleanout Box Schedule Of Installation 18” to 42” RCP 12” to 48” CMP	01/01/08
CB 9D	Standard Catch Basin And Cleanout Box Schedule Of Installation 48” to 66” RCP 60” to 78” CMP	01/01/08
CB 10A	Standard Catch Basin And Cleanout Box Situation And Layout	01/01/08
CB 10B	Standard Catch Basin And Cleanout Box Section Details	01/01/08
CB 10C	Standard Catch Basin And Cleanout Box Schedule Of Installation 42” to 60” RCP 48” to 72” CMP	01/01/08
CB 11	Standard Manhole	01/01/08

Crash Cushions (CC)

CC 1	Crash Cushion Markings	01/01/08
CC 2	Crash Cushion Drainage Details Guideline A	01/01/08
CC 3	Crash Cushion Drainage Details Guideline B	01/01/08

CC 4	Details For Placement Crash Cushions Type A, B, And D	02/28/08
CC 5A	Grading And Placement Details Crash Cushion Type C “Brakemaster”	**10/30/08**
CC 5B	Grading And Placement Details Crash Cushion Type C “C.A.T”	**10/30/08**
CC 5C	Grading And Placement Details Crash Cushion Type C “FLEAT-MT”	**10/30/08**
CC 6	Crash Cushion Type E Sand Barrel Details	01/01/08
CC 7A	Grading And Installation Details Crash Cushion Type F Quad Trend 350	**10/30/08**
CC 7B	Crash Cushion Type F BEAT-SSCC	**10/30/08**
CC 8A	Grading And Installation Details Crash Cushion Type G	**10/30/08**
CC 8B	Grading And Installation Details For “3R” Projects Crash Cushion Type G	**10/30/08**
CC 9A	Grading And Installation Details Crash Cushion Type H	**10/30/08**
CC 9B	Grading And Installation Details Crash Cushion Type H (Parabolic Flare)	**10/30/08**

Diversion Boxes (DB)

DB 1A	Standard Diversion Box/Cover Plate/Grating For 18” DIA. or 24” DIA. Pipe	01/01/08
DB 1B	Standard Diversion Box Hinged Lid Details For 18” DIA. or 24” DIA. Pipe	01/01/08
DB 1C	Standard Diversion Box Bicycle - Safe Grating Details For 18” DIA. or 24” DIA. Pipe	01/01/08
DB 1D	Standard Diversion Box Three Gate Box Sections For 18” DIA. or 24” DIA. Pipe	01/01/08
DB 1E	Standard Diversion Box Three Gate Box Sections For 18” DIA. or 24” DIA. Pipe	01/01/08
DB 1F	Standard Diversion Box Three Gate Box Sections For 18” DIA. or 24” DIA. Pipe	01/01/08
DB 2A	Standard Diversion Box w/Interchangeable Walls, Bottom Slab, Walls And Apron Details	01/01/08
DB 2B	Standard Diversion Box w/Interchangeable Walls, Quantities Schedule	01/01/08
DB 2C	Standard Diversion Box w/Interchangeable Walls, Hand Slide Gate Details	01/01/08
DB 2D	Standard Diversion Box Type “G” Hand Slide Gate Details	01/01/08
DB 2E	Standard Diversion Box Hinged Lid (Solid Cover Plate) Type “A” Details Type I Plan	01/01/08
DB 2F	Standard Diversion Box Hinged Lid (Solid Cover Plate) Type “A” Details Type II Plan	01/01/08
DB 2G	Standard Diversion Box Hinged Lid Solid Cover Type “B” Details	01/01/08
DB 2H	Standard Diversion Box Hinged Lid Solid Cover Type “B” And “C” Details	01/01/08
DB 3A	Standard Diversion Box With Manhole Cover Situation And Layout	01/01/08
DB 3B	Standard Diversion Box With Manhole Cover Up To 42” RCP And Up To 54” CMP	01/01/08
DB 3C	Standard Diversion Box With Manhole Cover 48” to 72” RCP And 60” to 84” CMP	01/01/08
DB 4	Standard Transition Concrete Lined Ditch To Pipe Or Diversion Box	01/01/08

Design Drawings (DD)

DD 1	Superelevation And Widening	01/01/08
DD 2	Surface Ditch, Benched Slope, And Cut Ditch Details	01/01/08
DD 3	Climbing Lanes	01/01/08
DD 4	Geometric Design for Freeways (Roadway)	01/01/08

DD 5A	Entrance And Exit Ramps At Crossroads	01/01/08
DD 5B	Entrance And Exit Ramps At Crossroads	01/01/08
DD 6	Entrance And Exit Ramp Geometrics	01/01/08
DD 7	Freeway Crossover	01/01/08
DD 8	Structural Geometric Design Standards For Clearances	**10/30/08**
DD 9	Structural Geometric Design Standards	**10/30/08**
DD 10	Railroad Clearances At Highway Overpass Structures	01/01/08
DD 11	Rural Multi Lane Highways Other Than Freeways	04/24/08
DD 12	Rural Two Lane Highways	01/01/08
DD 13	Frontage And Access Roads (Under 50 ADT)	01/01/08
DD 14A	Typical Rural 2 Lane Road 'Tee' Intersection (High Speed)	01/01/08
DD 14B	Typical Rural 2 Lane Road 'Tee' Intersection (Low Speed)	01/01/08
DD 15A1	Typical Rural 2 Lane Road Intersection (High Speed)	01/01/08
DD 15A2	Typical Rural 2 Lane Road Intersection (High Speed) With Left Turn Acceleration Lane	01/01/08
DD 15B	Typical Rural 2 Lane Road Intersection (Low Speed)	01/01/08
DD 16	Embankment for Bridge Placement	08/28/08
DD 17	Grade Separated Arterials Other Than Freeways 50 to 60 MPH	**10/30/08**

Drainage (DG)

DG 1	Fill Height for Metal Pipe (Steel)	01/01/08
DG 2	Fill Height for Metal Pipe (Aluminum)	01/01/08
DG 3	Maximum Fill Height For HDPE And PVC Pipes	01/01/08
DG 4	Pipe Minimum Cover	01/01/08
DG 5A	Plastic Pipe Culvert Installation	01/01/08
DG 5B	Metal Pipe Or Pipe Arch Culvert Installation	01/01/08
DG 5C	Precast Concrete Pipe Culvert Installation	01/01/08
DG 6	Safety Slope End Section For Circular and Arched Pipes	01/01/08
DG 7	Gasketted Joints Or Coupling Bands For CMP	01/01/08
DG 8	Metal Culvert End Section	01/01/08
DG 9	Miscellaneous Pipe Details	01/01/08

Environmental Controls (EN)

EN 1	Temporary Erosion Control (Check Dams)	01/01/08
EN 2	Temporary Erosion Control (Silt Fence)	01/01/08
EN 3	Temporary Erosion Control (Slope Drain And Temporary Berm)	01/01/08
EN 4	Temporary Erosion Control (Drop Inlet Barriers)	01/01/08
EN 5	Temporary Erosion Control (Pipe Inlet And Curb Inlet Barriers)	01/01/08
EN 6	Temporary Erosion Control (Sediment Trap and Stabilized Construction Entrance)	01/01/08
EN 7	Temporary Erosion Control (Straw Bale Barrier)	01/01/08

Fence And Gates (FG)

FG 1A	Right Of Way Fence And Gates (Wood Post)	01/01/08
FG 1B	Right Of Way Fence And Gates (Wood Post)	01/01/08
FG 2A	Right Of Way Fence And Gates (Metal Post)	01/01/08

FG 2B	Right Of Way Fence And Gates (Metal Post)	01/01/08
FG 3	Swing Gates Type I For Gates Less Than 17’	01/01/08
FG 4A	Standard Wildlife Escape Ramp Details	01/01/08
FG 4B	High Migratory Wildfile Escape Ramp Details	01/01/08
FG 5	Swing Gates Type II For Gates Wider Than 17’	01/01/08
FG 6	Chain Link Fence	01/01/08

Grates, Frames, And Trash Racks (GF)

GF 1	Manhole Frame And Grated Cover	01/01/08
GF 2	Manhole Frame And Solid Cover	01/01/08
GF 3	Rectangular Grate And Frame	01/01/08
GF 4	Directional Flow Grate And Frame	01/01/08
GF 5	Solid Cover And Frame	01/01/08
GF 6	Manhole Steps	01/01/08
GF 7	Standard Screw Gate And Frame	01/01/08
GF 8	2’ x 2’ Grate And Frame	01/01/08
GF 9	28” x 24” Directional Flow Grate And Frame	01/01/08
GF 10	Standard Trash Racks 90 ° X-ing Angle	01/01/08
GF 11	Standard Trash Racks	01/01/08
GF 12	Standard Trash Racks	01/01/08
GF 13	Open Curb Inlet Grate and Frame	01/01/08
GF 14	Solid Cover For Std Dwg DB 1 MS-18 Loading	01/01/08
GF 15	Standard Screw Gate And Frame	01/01/08

General Road Work (GW)

GW 1A	Raised Island	01/01/08
GW 1B	Raised Island and Plowable End Section	01/01/08
GW 2	Concrete Curb And Gutter	01/01/08
GW 3	Concrete Curb And Gutter Details	01/01/08
GW 4	Concrete Driveways And Sidewalks	01/01/08
GW 5A	Pedestrian Access	01/01/08
GW 5B	Pedestrian Access	01/01/08
GW 5C	Pedestrian Access	01/01/08
GW 6	Right Of Way Marker	01/01/08
GW 7	Newspaper And Mailbox Stop Layout	01/01/08
GW 8	Newspaper And Mailbox Support Hardware	01/01/08
GW 9	Delineation Hardware	**10/30/08**
GW 10	Delineation Application	01/01/08
GW 11	Sidewalks And Shoulders On Urban Roadways	01/01/08

Paving (PV)

PV 1	Joints For Highways With Concrete Traffic Lanes And Shoulders	01/01/08
PV 2	Pavement/Approach Slab Details	01/01/08
PV 3	Concrete Pavement Details For Urban And Interstate	01/01/08
PV 4	Concrete Pavement Details For Urban And Interstate	01/01/08
PV 5	Urban Concrete Pavement Details	01/01/08

PV 6	Rumble Strips	01/01/08
PV 7	Rumble Strips - Typical Application	01/01/08
PV 8	Rumble Strips - Centerline Application	01/01/08
PV 9	Dowel Bar Retrofit	01/01/08

Signals (SL)

SL 1A	Traffic Signal Mast Arm Pole And Luminaire Extension	01/01/08
SL 1B	Traffic Signal Mast Arm Pole And Luminaire Extension	01/01/08
SL 2	Traffic Signal Mast Arm Details 30’ Thru 75’	01/01/08
SL 3	Underground Service Pedestal Details	01/01/08
SL 4	Traffic Signal Mast Arm Pole Foundation	01/01/08
SL 5	Traffic Signal Pole	01/01/08
SL 6	Pole Mounted Power Source Details	01/01/08
SL 7	Span Wire Signal Pole Details	01/01/08
SL 8	Signal Head Details	01/01/08
SL 9	Pedestrian Signal Assembly	01/01/08
SL 10	Traffic Signal Controller Base Details	01/01/08
SL 11	Traffic Signal Loop Detector Details	01/01/08
SL 12	Traffic Counting Loop Detector Details	01/01/08
SL 13	Video Detection Camera Mount	01/01/08
SL 14	Highway Luminaire Pole Ground Mount	01/01/08
SL 15	Luminaire Slip Base Details	01/01/08
SL 16	Highway Luminaire Pole Barrier Mount	01/01/08
SL 17	Highway Luminaire Pole Foundation Extension	01/01/08
SL 18	Single Transformer Substation Details	02/28/08

Signs (SN)

SN 1	Bridge Load Limits Signs	01/01/08
SN 2	School Speed Limit Assembly	01/01/08
SN 3	Overhead School Speed Limit Assembly	01/01/08
SN 4	Not Used	
SN 5	Typical Installation For Milepost Signs	01/01/08
SN 6	Speed Reduction Sign Sequence	01/01/08
SN 7A	Placement of Ground Mount Signs	01/01/08
SN 7B	Placement of Ground Mount and Barrier Mount Signs	01/01/08
SN 8A	Temporary Use Ground Mounted Timber Sign Post	01/01/08
SN 8B	Temporary Use Ground Mounted Square Steel Sign Post	01/01/08
SN 9A	Small Sign Tubular Steel Post Base With Concrete (B1)	01/01/08
SN 9B	Small Sign Tubular Steel Post Base (B2A)	08/28/08
SN 9C	Small Sign Tubular Steel Post Base With Concrete (B2B)	08/28/08
SN 10A	Slipbase Sign Base (B3) Hardware	01/01/08
SN 10B	Slipbase Sign Base (B3) Installation	01/01/08
SN 11	Surface Mounted Tubular Steel Sign Bases (B4A and B4B)	01/01/08
SN 12	Barrier Mounted Tubular Steel Sign Bases (B5A and B5B)	01/01/08
SN 13A	Tubular Steel Sign Mounting Requirements	01/01/08
SN 13B	Tubular Steel Sign Mounting Hardware	01/01/08

SN 13C	"Z" Bar Mounting Requirements	01/01/08
SN 14A	Freeway Sign Post Requirements	01/01/08
SN 14B	Freeway Sign Base and Post Requirements (B6A-B6B-B6C)	01/01/08
SN 14C	Freeway Sign Foundation and Fuse Plate Requirements	02/28/08
SN 14D	Freeway Sign Frame Fabrication Details	01/01/08
SN 14E	Freeway Sign Bracket Details	01/01/08

Striping (ST)

ST 1	Object Markers "T" Intersection And Pavement Transition Guidance	01/01/08
ST 2	Freeway Crossover Markings	01/01/08
ST 3A	Typical Pavement Markings	01/01/08
ST 3B	Typical Pavement Markings	01/01/08
ST 3C	Typical Pavement Markings	01/01/08
ST 3D	Typical Pavement Markings	01/01/08
ST 4	Crosswalks, Parking And Intersection Approaches	01/01/08
ST 5	Painted Median And Auxiliary Lane Details	02/28/08
ST 6	Passing/Climbing Lanes Traffic Control	01/01/08
ST 7	Pavement Markings And Signs At Railroad Crossing	01/01/08
ST 8	Plowable Pavement Markers	01/01/08
ST 9	School Crossing And School Message	01/01/08

Structures And Walls (SW)

SW 1A	Welded End Guard Unit	01/01/08
SW 1B	Precast Concrete Cattle Guard	01/01/08
SW 2	Noise Wall Placement Options	01/01/08
SW 3A	Precast Concrete Noise Wall 1 Of 2	01/01/08
SW 3B	Precast Concrete Noise Wall 2 Of 2	01/01/08
SW 4A	Precast Concrete Retaining/Noise Wall 1 Of 3	01/01/08
SW 4B	Precast Concrete Retaining/Noise Wall 2 Of 3	01/01/08
SW 4C	Precast Concrete Retaining/Noise Wall 3 Of 3	01/01/08
SW 5	Precast Pilaster Post	01/01/08
SW 6	Precast Concrete Panel Surface Texture Options	01/01/08

Traffic Control (TC)

TC 1	Traffic Control Drawing Series General Notes	01/01/08
TC 2A	Work Zone Channelization Devices	08/28/08
TC 2B	Work Zone Signing	01/01/08
TC 2C	Work Zone Advanced Warning Arrow Panels	01/01/08
TC 2D	Delineator Mounted Work Zone Sign Bracket	01/01/08
TC 3	Hazard Mitigation	01/01/08
TC 4A	Standard Work Zone Signing General	01/01/08
TC 4B	Reduced Speed Work Zone Signing General	01/01/08
TC 4C	Traffic Control Project Limit Signing	01/01/08
TC 4D	Work Zone Specialty Signs	01/01/08
TC 5	Traffic Control Urban Intersection With Roadways Under 50 MPH	01/01/08
TC 6	Traffic Control Pedestrian Routing	01/01/08

TC 7	Traffic Control Road Closed, Diversion	01/01/08
TC 8	Traffic Control Lane Closure	01/01/08
TC 9	Work Zone Business Access Signing	01/01/08
TC 10	Traffic Control Expressway And Freeway Crossover/Turn Around	01/01/08
TC 11	Traffic Control Exit Ramp Gore	01/01/08
TC 12	Traffic Control Entrance Ramp Gore	01/01/08
TC 13	Traffic Control Shoulder Haul Road	01/01/08
TC 14	Traffic Control Flagging Operation	01/01/08
TC 15	Traffic Control 2 Lane/2 Way Seal Coat With Cover Material	01/01/08
TC 16	Traffic Control For Non-Durable Pavement Marking	01/01/08

Listing of Supplemental Drawings

Issue Date: March 5, 2008

Revised February 28, 2008

CC 4	Details For Placement Crash Cushions Type A, B, and D
SL 18	Single Transformer Substation Details
SN 14C	Freeway Sign Foundation And Fuse Plate Requirements
ST 5	Painted Median And Auxiliary Lane Details

Issue Date: May 8, 2008

Revised April 24, 2008

CC 7B	Crash Cushion Type F BEAT-SSCC
DD 11	Rural Multi Lane Highways Other Than Freeways
DD 16	Embankment For Bridge Replacement
DD 17	Grade Separated Arterials Other Than Freeways 50 to 60 MPH

Issue Date: September 11, 2008

Revised August 28, 2008

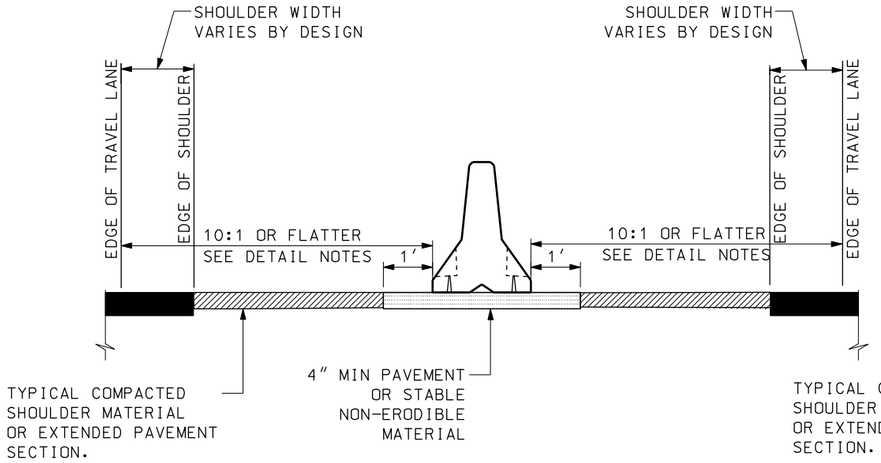
DD 16	Embankment For Bridge Replacement
SN 9B	Small Sign Tubular Steel Post Base (B2A)
SN 9C	Small Sign Tubular Steel Post Base With Concrete (B2B)
TC 2A	Work Zone Channelization Devices

Issue Date: December 3, 2008

Revised October 30, 2008

BA 1D	Precast Concrete Full Section Median Installation (New Jersey Shape)
BA 1E	Precast Concrete Full Section Shoulder Applications (New Jersey Shape)
BA 3B1	Precast Constant Slope Barrier
BA 3B2	Precast Constant Slope Barrier
BA 3B3	Precast Concrete Constant Slope Transition Section For Crash Cushion And W-Beam Guardrail
BA 4E1	W-Beam Guardrail Installations
BA 4E2	W-Beam Guardrail Installations
BA 4L	W-Beam Guardrail Curve Details

CC 5A	Grading And Placement Details Crash Cushion Type C “Brakemaster”
CC 5B	Grading And Placement Details Crash Cushion Type C “C.A.T”
CC 5C	Grading And Placement Details Crash Cushion Type C “FLEAT-MT”
CC 7A	Grading And Installation Details Crash Cushion Type F Quad Trend 350
CC 7B	Crash Cushion Type F BEAT-SSCC
CC 8A	Grading And Installation Details Crash Cushion Type G
CC 8B	Grading And Installation Details For “3R” Projects Crash Cushion Type G
CC 9A	Grading And Installation Details Crash Cushion Type H
CC 9B	Grading And Installation Details Crash Cushion Type H (Parabolic Flare)
DD 8	Structural Geometric Design Standards For Clearances
DD 9	Structural Geometric Design Standards
DD 17	Grade Separated Arterials Other Than Freeways 50 to 60 MPH
GW 9	Delineation Hardware

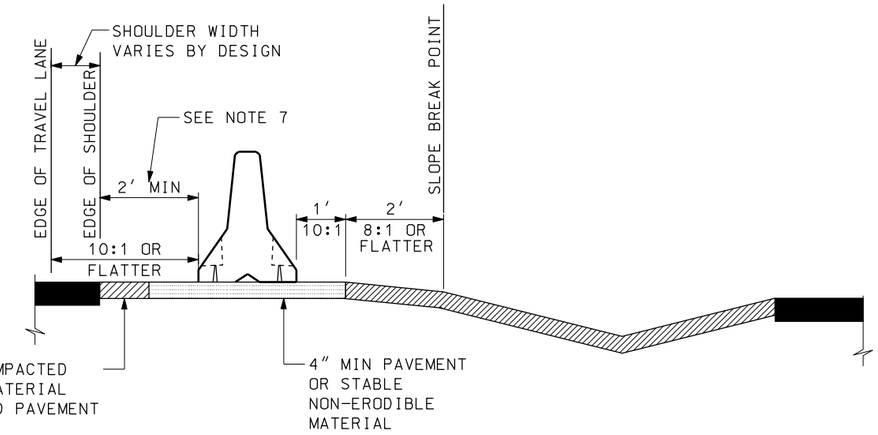


MEDIAN INSTALLATION

USE THIS DETAIL WHEN MEDIAN BARRIER IS WARRANTED

1. NO STABILIZATION PINS ARE REQUIRED WHEN BARRIER FACE IS GREATER THAN 12 FEET FROM TRAVEL LANE.

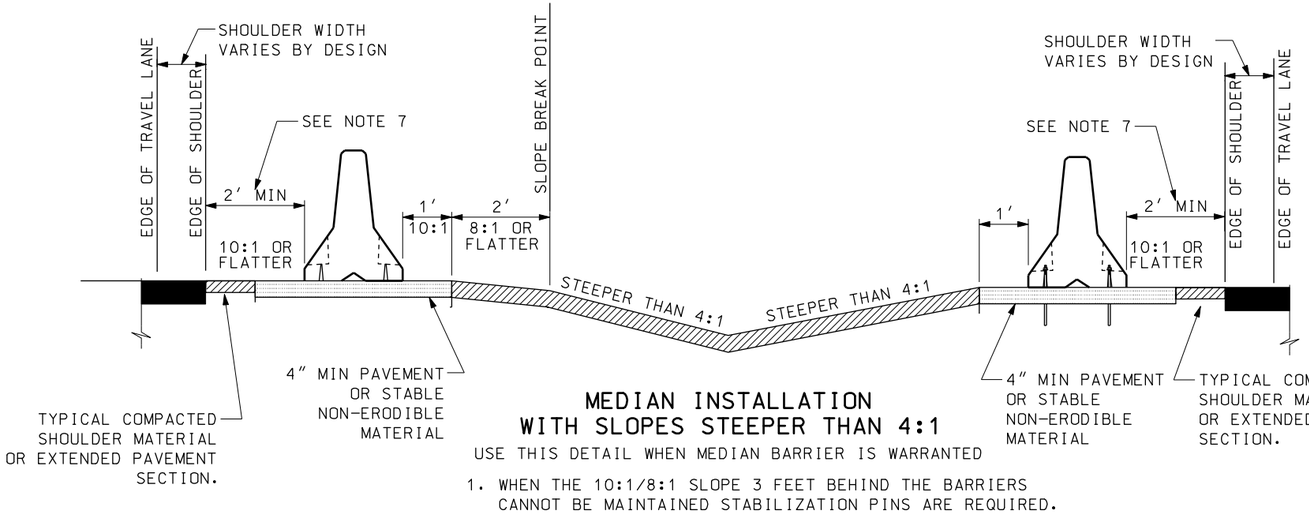
2. INSTALL STABILIZATION PINS WHEN BARRIER FACE IS 12 FEET OR LESS FROM TRAVEL LANE.



MEDIAN INSTALLATION W/ OFFSET ROADWAY

USE THIS DETAIL WHEN MEDIAN BARRIER IS WARRANTED

1. WHEN THE 10:1/8:1 SLOPE 3 FEET BEHIND THE BARRIERS CANNOT BE MAINTAINED STABILIZATION PINS ARE REQUIRED.



MEDIAN INSTALLATION WITH SLOPES STEEPER THAN 4:1

USE THIS DETAIL WHEN MEDIAN BARRIER IS WARRANTED

1. WHEN THE 10:1/8:1 SLOPE 3 FEET BEHIND THE BARRIERS CANNOT BE MAINTAINED STABILIZATION PINS ARE REQUIRED.

NOTES:

1. USE APPROPRIATE FLARE RATE AS SUGGESTED IN THE ROADSIDE DESIGN GUIDE, CURRENT EDITION, FOR RIGID BARRIER SYSTEMS, WHEN BARRIER IS PLACED WITH A FLARE. REFER TO STD DWG BA 1E, NOTE 4, FOR APPROPRIATE END TREATMENT OR CRASH CUSHION REQUIREMENTS.

2. PLACE BARRIER ON A 4" PAVED OR STABLE NON-ERODIBLE SURFACE.

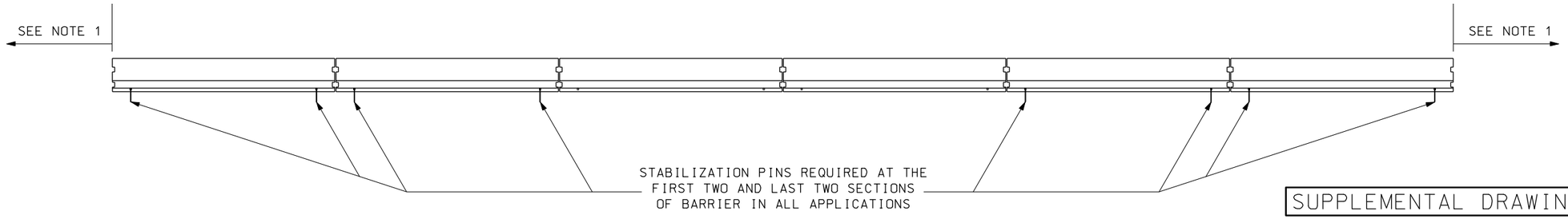
3. DO NOT PLACE BARRIER ON TOP OF ANY CURBING.

4. PIN ALL BARRIER SECTIONS TOGETHER AT CONNECTION LOOPS.

5. PRE-DRILL A 1" DIA. HOLE THROUGH PAVED SURFACE PRIOR TO INSTALLING THE STABILIZATION PIN.

6. PLACE AN ADEQUATE AMOUNT OF SILICON ADHESIVE ON THE BOTTOM WASHER OF THE CONNECTION PIN BEFORE INSERTING, TO HOLD IN PLACE AND PREVENT EASY HAND REMOVAL.

7. WHEN ROADWAY DESIGN REQUIRES 12' OR WIDER EFFECTIVE SHOULDER THE 2' MIN OFFSET IS OPTIONAL.



SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	ADDED NOTE 7 AND SEVERAL EDITORIAL UPDATES
			CHANGED NON-PERMEABLE TO STABLE NON-ERODIBLE.
			ADDED 'OR EXTENDED PAVEMENT SECTION' TO COMPACTED
			SHOULDER CALLOUTS.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

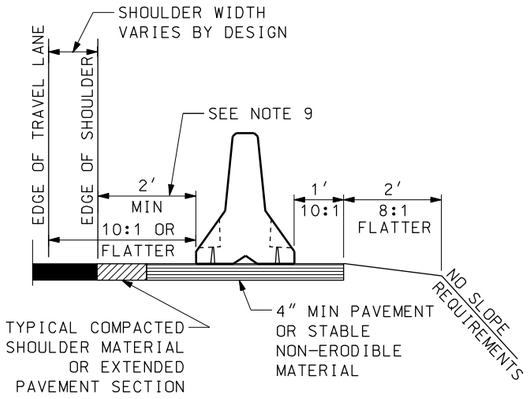
RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

PRECAST CONCRETE
FULL SECTION MEDIAN
INSTALLATION
(NEW JERSEY SHAPE)

STANDARD DRAWING TITLE

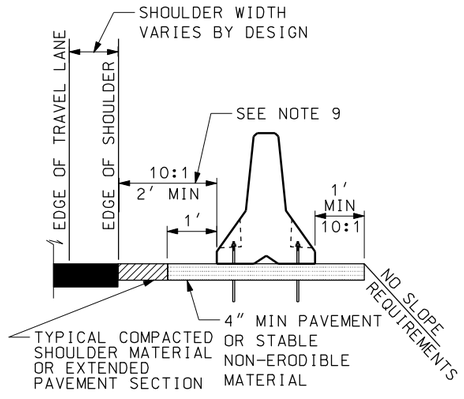
STD DWG
BA 1D

DGN File:L:\Standard Drawings\Imperials\2008Approved\x_Supplemental Issues\xSupp4Approved\BA01D.dgn
02-DEC-2008



SHOULDER INSTALLATION OPTION 1

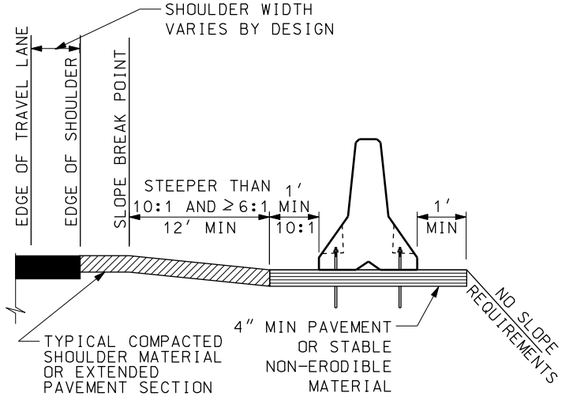
NO STABILIZATION PINS REQUIRED



SHOULDER INSTALLATION OPTION 2

STABILIZATION PINS REQUIRED

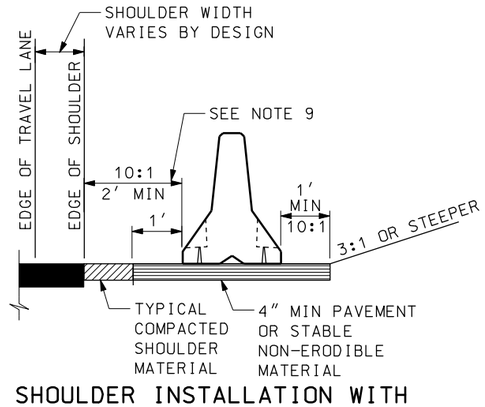
SEE NOTE 4



SHOULDER INSTALLATION OPTION 3

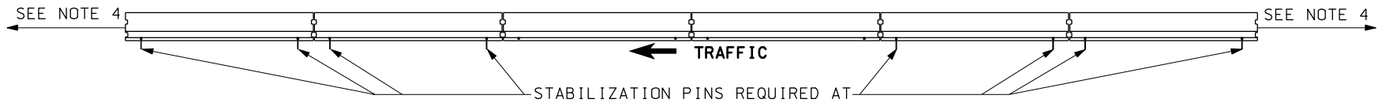
STABILIZATION PINS REQUIRED

SEE NOTE 4



SHOULDER INSTALLATION WITH 3:1 OR STEEPER BACKSLOPE

NO STABILIZATION PINS REQUIRED



FORMULAS FOR LENGTH OF NEED CALCULATIONS BURIED IN TERMINAL SECTION ONLY

BACKSLOPE STEEPER THAN 3:1

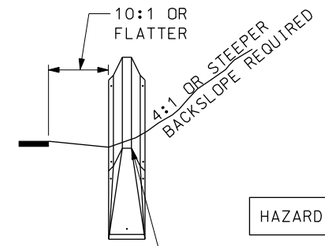
LON= FLR x D1

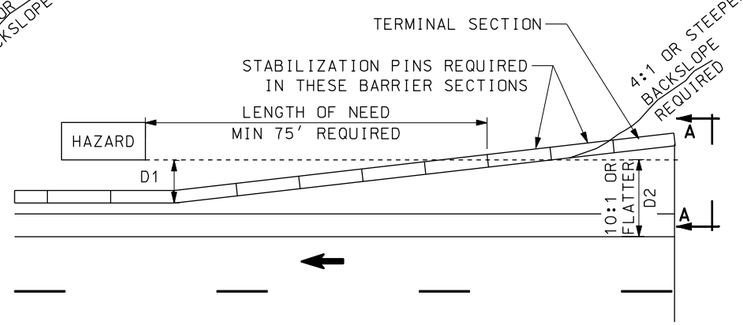
BACKSLOPE 3:1 TO A MINIMUM 4:1

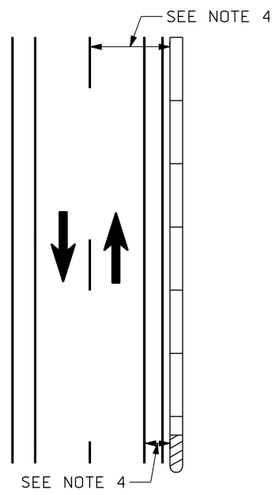
≥ 50 MPH "LON"= 450 – (15 x D2)
≤ 45 MPH "LON"= 250 – (15 x D2)

LON: LENGTH OF NEED
FLR: BARRIER FLARE RATE
D1: DISTANCE FROM FACE OF BARRIER TO FACE OF HAZARD OR DITCH BOTTOM
D2: DISTANCE FROM EDGE OF TRAVEL LANE TO FACE OF HAZARD OR DITCH BOTTOM

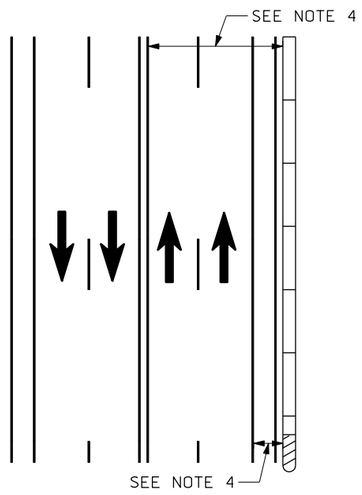
SECTION A–A



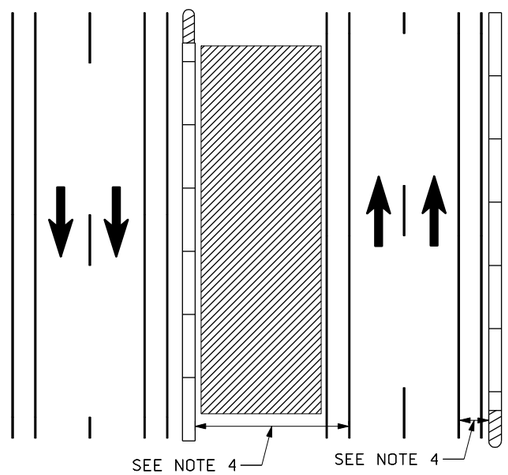




TWO LANE/TWO WAY



MULTI–LANE ARTERIAL



MULTI–LANE ARTERIAL WITH TRAVERSABLE MEDIAN

NOTES:

1. USE REQUIRED CLEAR ZONE FROM THE ROADSIDE DESIGN GUIDE, CURRENT EDITION. USE APPROPRIATE FLARE RATE AS SUGGESTED IN ROADSIDE GUIDE, CURRENT EDITION, FOR RIGID BARRIER SYSTEMS, WHEN BARRIER IS PLACED WITH A FLARE.
2. PLACE BARRIER ON A 4″ PAVED OR STABLE NON–ERODIBLE SURFACE.
3. PIN ALL BARRIER SECTIONS TOGETHER AT CONNECTION LOOPS.
4. INSTALL APPROPRIATE END TREATMENT OR CRASH CUSHION WHEN BARRIER ENDS ARE WITHIN 1.2 TIMES THE REQUIRED MINIMUM AASHTO CLEAR ZONE AND THE DESIGN SPEED IS GREATER THAN 40 MPH.
   A. TERMINAL SECTION (STD DWG BA 1C) PERMITTED ON APPROACH ENDS WHEN DESIGN SPEED FOR ROADWAY IS 40 MPH OR LESS.
   B. INSTALL TERMINAL SECTION (STD DWG BA 1C) WHEN BARRIER END IS EXPOSED TO APPROACH TRAFFIC IS 1.2 TIMES OR GREATER THAN THE REQUIRED MINIMUM AASHTO CLEAR ZONE AND SPEEDS EXCEED 40 MPH. TERMINAL SECTION (STD DWG BA 1C) REQUIRED ON TRAILING END OF BARRIER ON DIVIDED ROADWAYS. USE OF TERMINAL SECTION (BA 1C) ON NON–DIVIDED ROADWAYS WHEN AN END TREATMENT OR CRASH CUSHION NOT REQUIRED.
   C. CHOOSE APPROPRIATE END TREATMENT OR CRASH CUSHION TYPE USING STD DWG CC SERIES AND CURRENT EDITION OF GUIDELINES FOR CRASH CUSHIONS AND END TREATMENTS
5. THE CONCRETE BARRIER DESIGN ALLOWS FOR A 3′ OUTWARD LATERAL MOVEMENT IF THE BARRIER IS STRUCK. STABILIZATION PINS ARE NOT REQUIRED WHEN USED ON A SHOULDER APPLICATION AND THE REQUIRED SLOPE OF 8:1 OR FLATTER EXIST 3′ BEHIND THE BARRIER. USE STABILIZATION PINS WHEN THE SLOPES ARE STEEPER THAN 8:1 AND WITHIN 3′ OF THE BARRIER BACKSIDE.
6. PRE–DRILL A 1″ DIA. HOLE THROUGH PAVED SURFACE PRIOR TO INSTALLING THE STABILIZATION PIN.
7. DO NOT PLACE BARRIER ON TOP OF ANY CURBING, 10′ OFFSET FROM FACE OF CURB REQUIRED.
8. DO NOT OVERLAY ANY MATERIAL PAST THE FIRST BREAK POINT ON THE BARRIER. THE FIRST BREAK POINT IS 3″ FROM THE BOTTOM OF THE BARRIER.
9. WHEN ROADWAY DESIGN REQUIRES A 12′ OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL.

SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	DELETED NOTE 9, COVERED ON OTHER DRAWINGS. NEW NOTE 9 ADDED AND SEVERAL EDITORIAL UPDATES. CHANGED NON-PERMEABLE TO STABLE NON-ERODIBLE. ADDED 'OR EXTENDED PAVEMENT SECTION' TO COMPACTED SHOULDER CALLOUTS.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

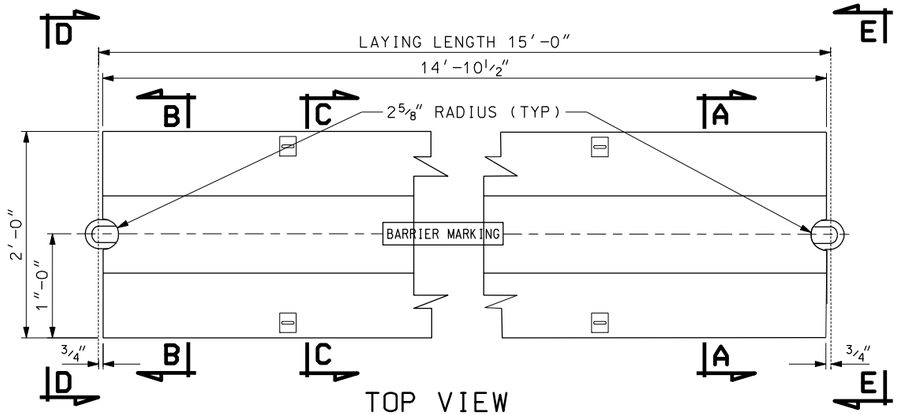
RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

PRECAST CONCRETE FULL SECTION SHOULDER APPLICATIONS (NEW JERSEY SHAPE)

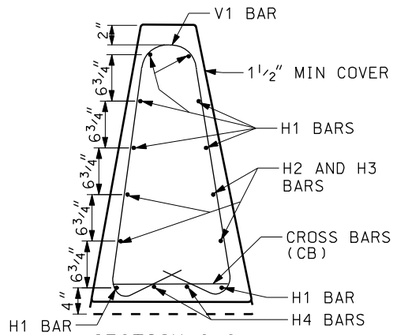
STANDARD DRAWING TITLE

STD DWG
BA 1E

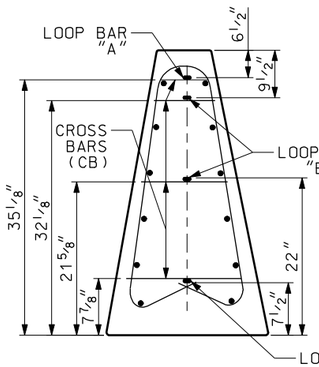
DGN File:L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\xSupp4Approved\BA01E.dgn
02-DEC-2008



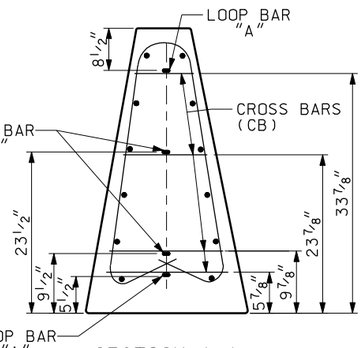
TOP VIEW



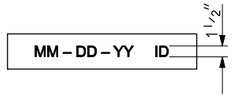
SECTION C-C
H BAR LOCATIONS
SCUPPER CUTOUT SHOWN
SEE NOTE 6



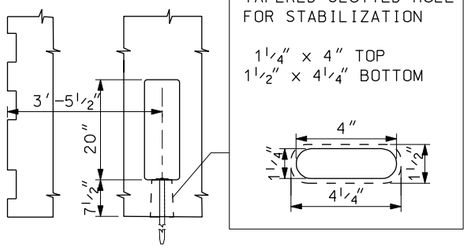
SECTION B-B
CROSS BAR & LOOP LOCATIONS



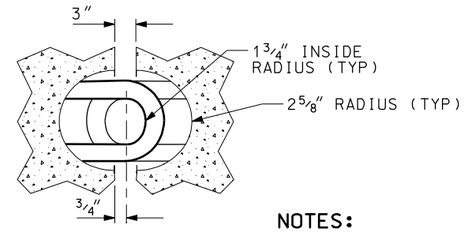
SECTION A-A
CROSS BAR & LOOP LOCATIONS



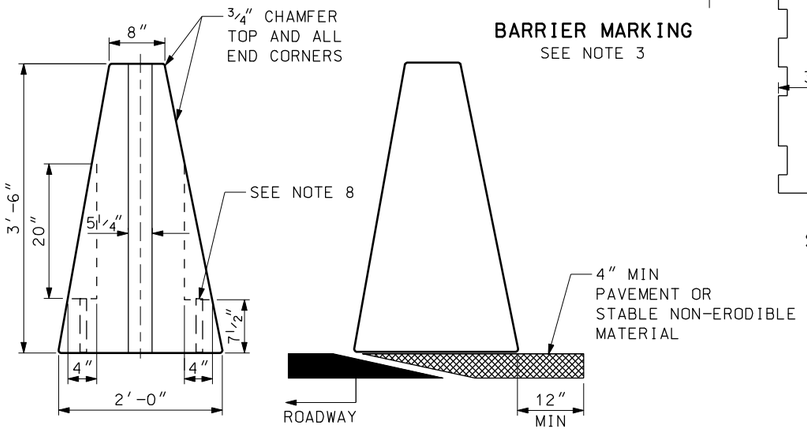
BARRIER MARKING
SEE NOTE 3



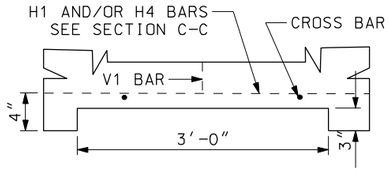
STABILIZATION PIN SLOT DETAIL
SEE NOTE 4 & 8



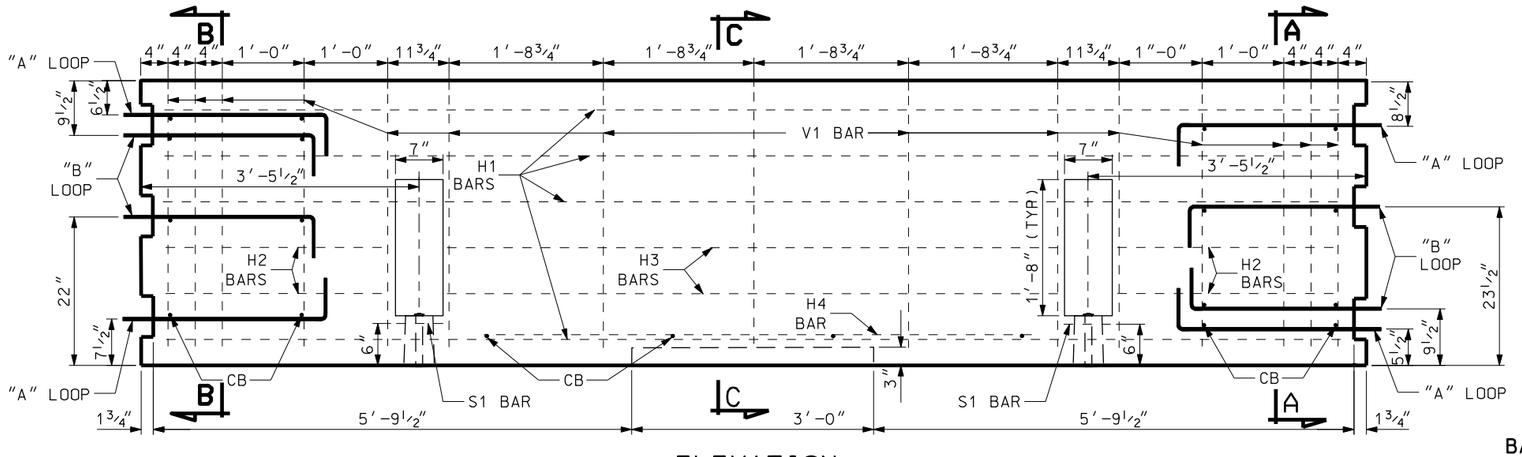
CONNECTION DETAIL



SEE INSTALLATION DETAILS STD DWG'S BA 1D OR BA 1E

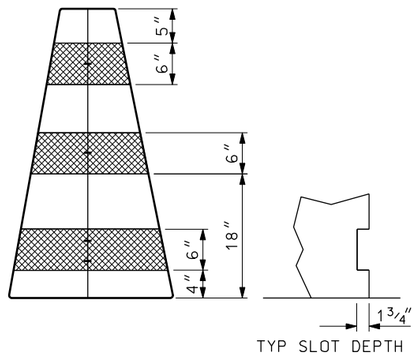


SCUPPER DETAIL
SEE NOTE 6 & 7



ELEVATION

SUPPLEMENTAL DRAWING



BARRIER END SLOT DETAIL
SECTION D-D & E-E

NOTES:

1. SEE STD DWG BA 3B2 FOR STEEL REQUIREMENTS.
2. USE CLASS AA (AE) CONCRETE.
3. MARK EACH BARRIER SECTION WITH 1½″ TALL NUMBERS INDICATING THE DATE OF CASTING AND IDENTIFICATION NUMBER SUPPLIED BY INSPECTOR, IMPRESSED ¼″ INTO TOP OF BARRIER.
4. SEE STD DWGS BA 1D AND BA 1E FOR PLACEMENT REQUIREMENTS AND STABILIZATION PIN USE REQUIREMENTS.
5. PRE-DRILL A 1″ DIA. HOLE THROUGH ROADWAY SURFACE PRIOR TO INSTALLING STABILIZATION PIN.
6. INDICATE ON PLAN WHEN BARRIER SECTION WITH SCUPPERS ARE REQUIRED.
7. PROVIDE BLOCK OUT AND ADDITIONAL REINFORCING STEEL FOR SCUPPERS WHEN NOTED ON PLANS. H-4 BARS NOT REQUIRED FOR BARRIER SECTION WITHOUT SCUPPER.
8. CENTER PIN SLOT IN BLOCK OUT.

NO.	DATE	APPR.	REMARKS
1	10-30-08	GS	NEW DRAWING.

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — OCT.30.2008 DATE

DEPUTY DIRECTOR

PRECAST CONCRETE CONSTANT SLOPE BARRIER

STANDARD DRAWING TITLE

STD DWG
BA 3B1

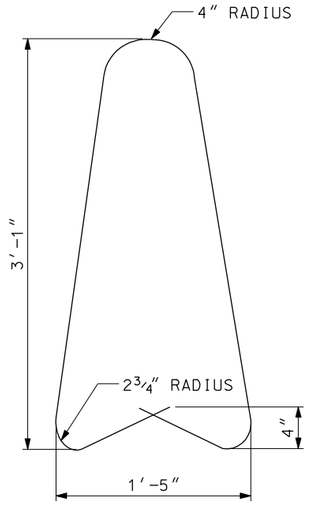
DGN File:L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\Supp4Approved\BA03B1.dgn

02-DEC-2008

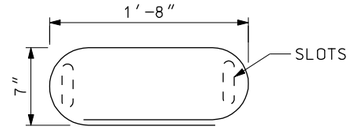
STEEL REINFORCEMENT TABLE
SEE NOTE 1

BAR MARK	BAR SIZE	NUMBER REQUIRED	BAR LENGTH	SKETCH
V1 BARS	BAR SIZE #5	15	8′-0″	SEE V1 DETAIL
H1 BARS	#5	8	14′-5″	14′-5″
H2 BARS	#5	8	3′-1″	3′-1″
H3 BARS	#5	4	7′-2″	7′-2″
H4 BARS	#5	2	6′-8½″	6′-8½″
CROSS BARS (CB)	#4	20		SIZE VARIES BASED ON LOCATION-CUT TO LENGTH
S1 BARS	#4	2	5′-1″	SEE S1 DETAIL
LOOP BARS "A"	¾ STEEL BAR	4	6′-6½″	SEE LOOP BAR DETAILS
LOOP BARS "B"	¾ STEEL BAR	4	6′-3½″	

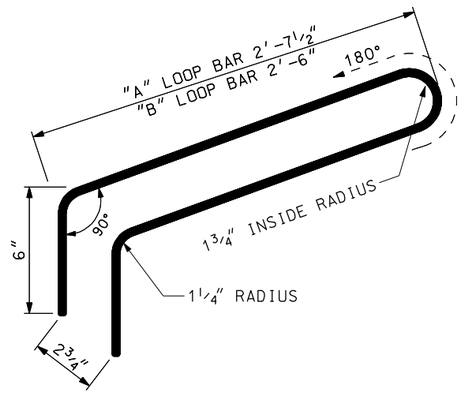
SEE NOTES 1, 2, 4.



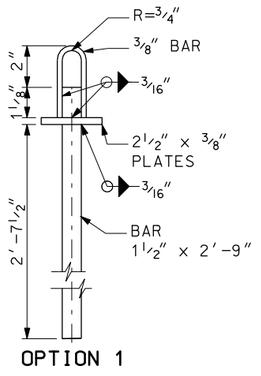
V1 BAR DETAIL



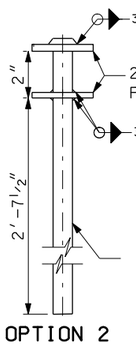
S1 BAR DETAIL



"A" & "B" LOOP BAR DETAILS
GALVANIZED STEEL ROUND
SEE NOTES 2, 3, 4

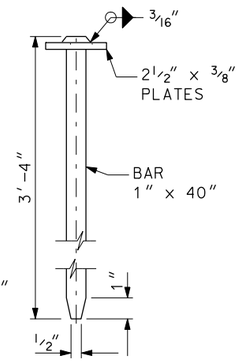


OPTION 1



OPTION 2

CONNECTION PIN DETAILS
SEE NOTES 2, 3, 5



STABILIZATION PIN DETAIL
SEE NOTES 2, 3, 5

NOTES:

1. MEET STANDARD SPECIFICATION 03211 FOR REINFORCING STEEL REQUIREMENTS. USE COATED BAR.
2. USE STEEL ROD MEETING ASTM A 36.
3. HOT DIP GALVANIZE LOOP BARS, CONNECTION PINS AND STABILIZATION PINS AFTER MANUFACTURING.
4. DO NOT HEAT REINFORCING STEEL OR LOOP BAR TO MAKE BENDS.
5. USE OF FORGED HEAD MEETING PLATE SIZE AND THICKNESS IS ACCEPTABLE IN PLACE OF WELDED PLATE.

SUPPLEMENTAL DRAWING

NO.	DATE	APPR.	REMARKS
1	10-30-08	GS	NEW DRAWING.

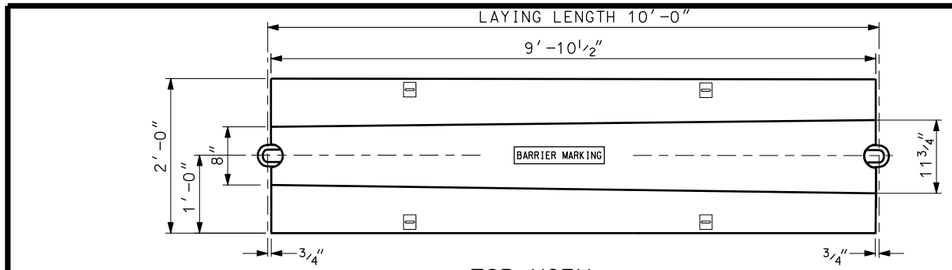
REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

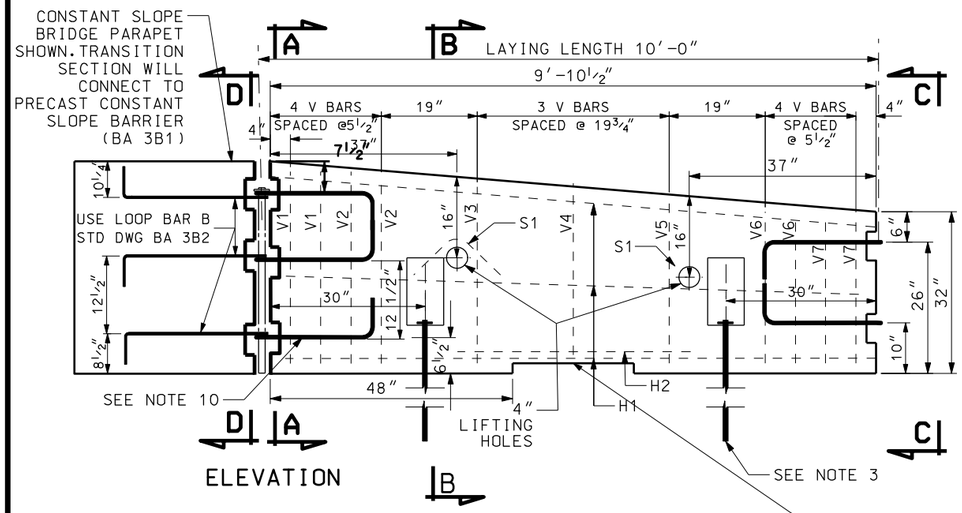
RECOMMENDED FOR APPROVAL — DEPUTY DIRECTOR — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — OCT.30.2008 DATE

PRECAST CONCRETE CONSTANT SLOPE BARRIER
STANDARD DRAWING TITLE

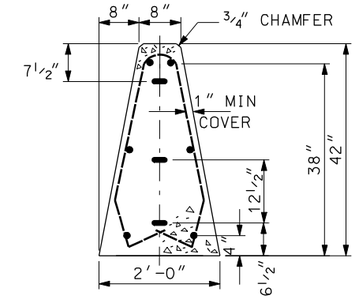
STD DWG
BA 3B2



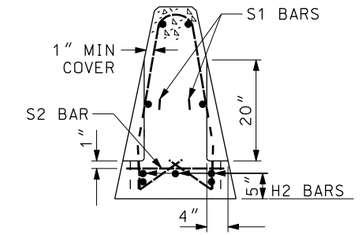
TOP VIEW



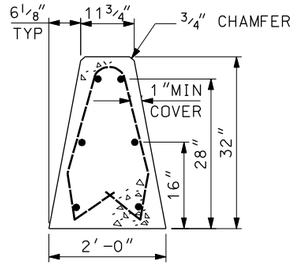
ELEVATION



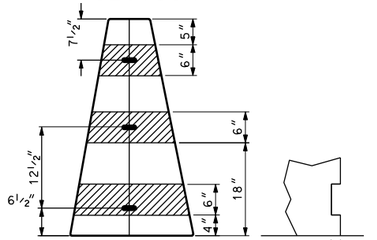
SECTION A-A



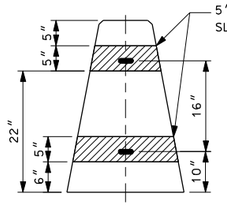
SECTION B-B



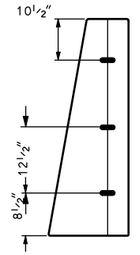
SECTION C-C



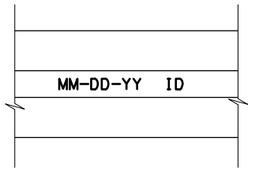
SLOT DETAIL
SECTION A-A
TYP SLOT DEPTH



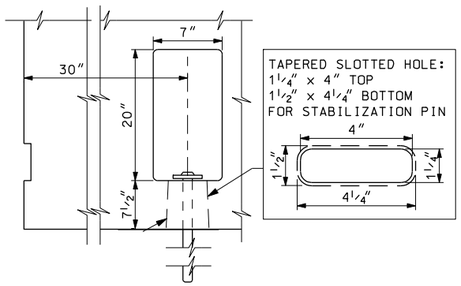
SLOT DETAIL
SECTION C-C



SECTION D-D
BRIDGE PARAPET
SEE STRUCTURE DETAILS



BARRIER MARKINGS
SEE NOTE 6



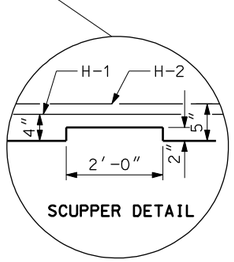
BARRIER STABILIZATION
SLOT DETAIL

STEEL REINFORCEMENT TABLE

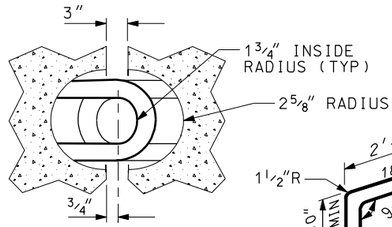
MARK	BAR SIZE	NO. OF BARS	SKETCH
H1	#5	(6) RUN THROUGH LENGTH OF BARRIER	9′-1″
H2	#5	(3) BARS CENTERED OVER SCUPPER	4′-4″
S1	#4	(2) 2 BARS CENTERED OVER EACH LIFTING HOLE	3 3⁄8″R, 2′-5″, 90°, 1″ COVER
S2	#4	(2) BARS CENTERED 1″ BELOW TOP OF STABILIZATION PIN SLOTS	1½″R, SLOTS, 7″, 1′-6″, 1″MIN CLEAR TO BAR

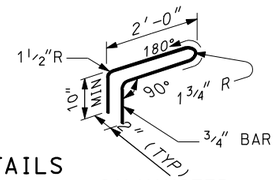
		#		D	
V1	#5	2	(11) BARS PLACED AS PER ELEVATION DETAIL	38″	2¼″R, 7″, 15″, 9¼″, D
V2	#5	2		37″	
V3	#5	1		35″	
V4	#5	1		34″	
V5	#5	1		33″	
V6	#5	2		30″	
V7	#5	2		29″	

SEE NOTE 7



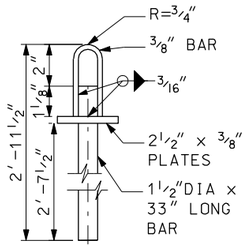
SCUPPER DETAIL



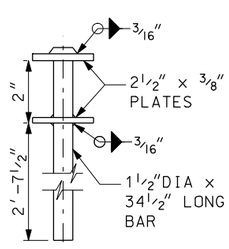


CONNECTION DETAILS

GALVANIZED STEEL BAR
SEE NOTE 10

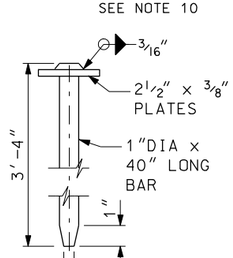


OPTION 1



OPTION 2

GALVANIZED CONNECTION PIN
SEE NOTES 7, 9



GALVANIZED STABILIZATION PIN
SEE NOTES 7, 9

SUPPLEMENTAL DRAWING

NOTES:

1. TRANSITION SECTION REQUIRED WHEN A CRASH CUSHION OR W-BEAM GUARDRAIL TRANSITION IS REQUIRED ON A CONSTANT SLOPE BRIDGE PARAPET OR PRECAST CONCRETE CONSTANT SLOPE BARRIER.
2. PROVIDE 4″ OF PAVEMENT OR STABLE NON-ERODIBLE MATERIAL 1′ IN FRONT OF AND 1′ ON BOTH SIDES OF TRANSITION SECTION. PLACE TRANSITION SECTION ON TOP OF FINAL PAVEMENT COURSE.
3. ALL APPLICATIONS REQUIRE THE INSTALLATION OF STABILIZATION PINS AND CONNECTION PINS. PRE DRILL 1″DIA. HOLE THROUGH PAVEMENT SURFACE PRIOR TO INSTALLING STABILIZATION PINS.
4. USE A 4″ WHITE PVC SLEEVE TO FORM THE LIFTING HOLES. LEAVE SLEEVE IN PLACE AFTER CASTING.
5. PLACE AN ADEQUATE AMOUNT OF SILICONE ADHESIVE ON BOTTOM OF WASHER BEFORE INSERTING PIN TO HOLD IN PLACE AND PREVENT EASY HAND REMOVAL.
6. MARK EACH TRANSITION SECTION WITH 1½″ NUMBERS INDICATING THE DATE OF CASTING AND IDENTIFICATION NUMBER SUPPLIED BY THE INSPECTOR, IMPRESSED¼″ DEEP INTO THE TOP CENTER OF THE BARRIER.
7. MEET STANDARD SPECIFICATION 03211 FOR REINFORCING STEEL REQUIREMENTS. USE COATED BAR. USE STEEL ROD MEETING ASTM A 36 FOR CONNECTION PINS AND STABILIZATION PINS. GALVANIZE AFTER MANUFACTURING.
8. USE CLASS AA(AE) CONCRETE.
9. USE OF A HOT FORGED HEAD, MEETING PLATE SIZE AND THICKNESS IS ACCEPTABLE IN PLACE OF A WELDED PLATE.
10. SPREADING LOOP BARS INSIDE BARRIER PERMITTED WHEN LOOP BARS OVERLAP. SECURE LEG ENDS TO EACH OTHER WHEN OVERLAP OCCURS. DO NOT DEFORM LOOP RADIUS.

NO.	DATE	APPR.	REMARKS
			REVISIONS
1	10-30-08	GS	PREVIOUSLY BA 3B. MODIFIED DRAWING TO MEET REQUIREMENTS OF PRECAST CONCRETE CONSTANT SLOPE BARRIER. ADDED TOP VIEW. REVISED NOTES 1, 7 AND 10.

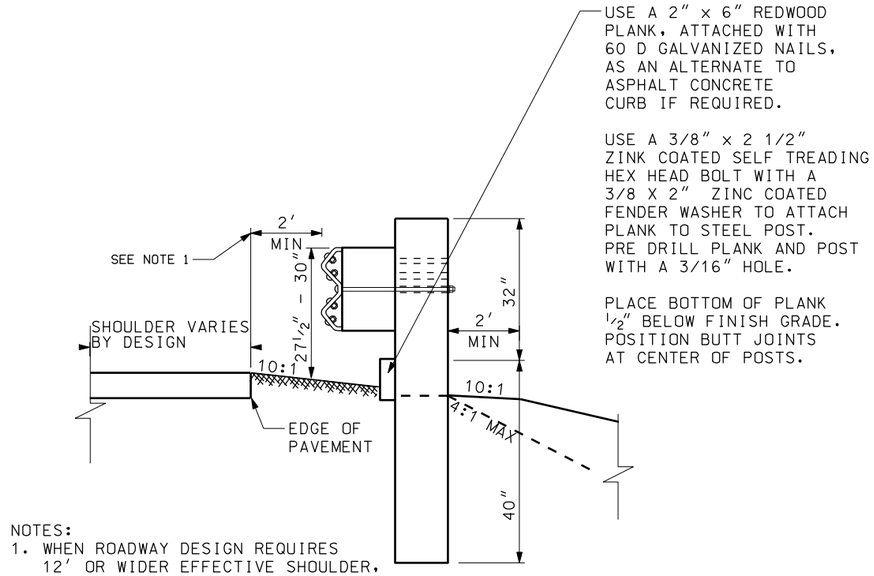
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

PRECAST CONCRETE CONSTANT SLOPE TRANSITION SECTION FOR CRASH CUSHION AND W-BEAM GUARDRAIL
STANDARD DRAWING TITLE

STD DWG
BA 3B3

02-DEC-2008
DGN File:L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\Supp4Approved\BA3B3.dgn



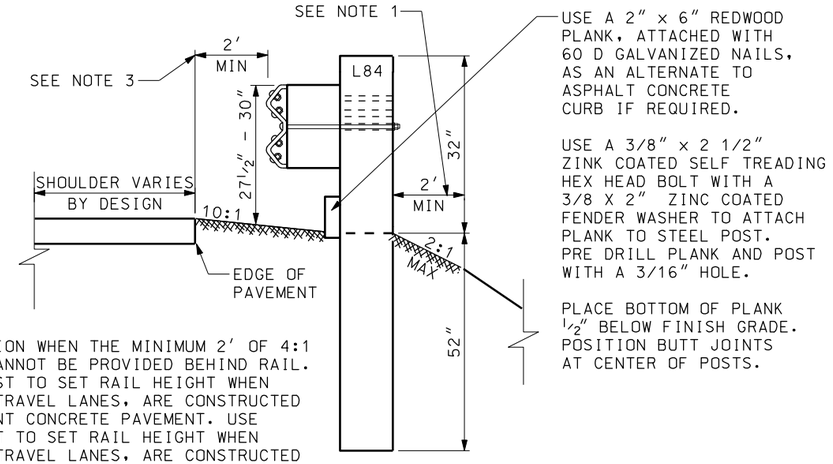
USE A 2″ x 6″ REDWOOD PLANK, ATTACHED WITH 60 D GALVANIZED NAILS, AS AN ALTERNATE TO ASPHALT CONCRETE CURB IF REQUIRED.

USE A 3/8″ x 2 1/2″ ZINK COATED SELF TREADING HEX HEAD BOLT WITH A 3/8 X 2″ ZINC COATED FENDER WASHER TO ATTACH PLANK TO STEEL POST. PRE DRILL PLANK AND POST WITH A 3/16″ HOLE.

PLACE BOTTOM OF PLANK ½″ BELOW FINISH GRADE. POSITION BUTT JOINTS AT CENTER OF POSTS.

NOTES:
1. WHEN ROADWAY DESIGN REQUIRES 12′ OR WIDER EFFECTIVE SHOULDER, THE 2′MIN OFFSET IS OPTIONAL. (PLACE AS FAR OFF PAVEMENT EDGE AS PRACTICAL)
2. USE TOP HOLE OF POST TO SET RAIL HEIGHT WHEN PAVEMENT SURFACE, TRAVEL LANES, ARE CONSTRUCTED WITH PORTLAND CEMENT CONCRETE PAVEMENT. USE BOTTOM HOLE OF POST TO SET RAIL HEIGHT WHEN PAVEMENT SURFACE, TRAVEL LANES, ARE CONSTRUCTED WITH HOT MIX ASPHALT (HMA).

INITIAL INSTALLATION
USE 72″ LONG POSTS



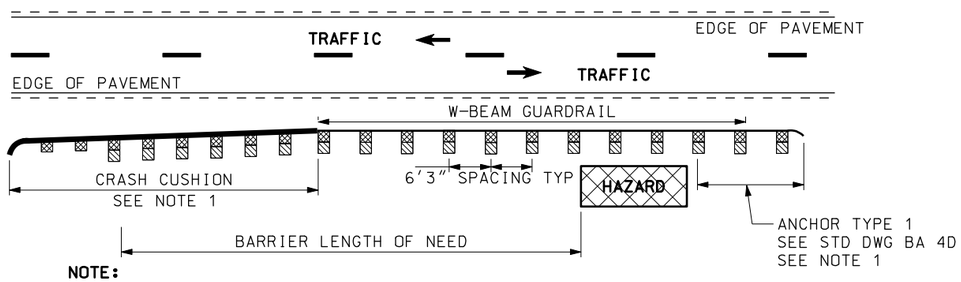
USE A 2″ x 6″ REDWOOD PLANK, ATTACHED WITH 60 D GALVANIZED NAILS, AS AN ALTERNATE TO ASPHALT CONCRETE CURB IF REQUIRED.

USE A 3/8″ x 2 1/2″ ZINK COATED SELF TREADING HEX HEAD BOLT WITH A 3/8 X 2″ ZINC COATED FENDER WASHER TO ATTACH PLANK TO STEEL POST. PRE DRILL PLANK AND POST WITH A 3/16″ HOLE.

PLACE BOTTOM OF PLANK ½″ BELOW FINISH GRADE. POSITION BUTT JOINTS AT CENTER OF POSTS.

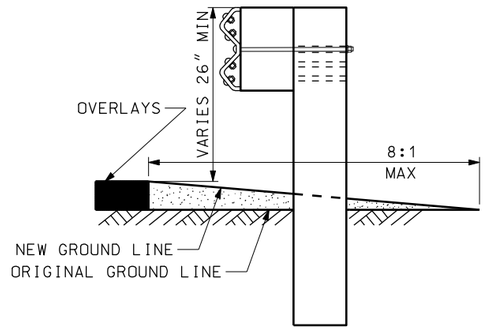
NOTES:
1. USE THIS INSTALLATION WHEN THE MINIMUM 2′ OF 4:1 OR FLATTER SLOPE CANNOT BE PROVIDED BEHIND RAIL.
2. USE TOP HOLE OF POST TO SET RAIL HEIGHT WHEN PAVEMENT SURFACE, TRAVEL LANES, ARE CONSTRUCTED WITH PORTLAND CEMENT CONCRETE PAVEMENT. USE BOTTOM HOLE OF POST TO SET RAIL HEIGHT WHEN PAVEMENT SURFACE, TRAVEL LANES, ARE CONSTRUCTED WITH HOT MIX ASPHALT (HMA).
3. WHEN ROADWAY DESIGN REQUIRES 12′ OR WIDER EFFECTIVE SHOULDER THE 2′ MIN OFFSET IS OPTIONAL. (PLACE AS FAR OFF PAVEMENT EDGE AS PRACTICAL)

INITIAL LONG POST INSTALLATION
USE 84″ LONG POSTS



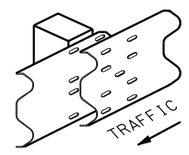
NOTE:
1. CRASH CUSHION REQUIRED WHEN BARRIER END IS WITHIN 1.2 TIMES AASHTO ROADSIDE DESIGN GUIDE CLEAR ZONE.

TYPICAL INSTALLATION



NOTES:
1. RAISE RAIL ELEMENT WHEN OVERLAY IS REQUIRED.
2. RAISED RAIL ELEMENT WILL ACCOMMODATE 6″ TO 8″ OF OVERLAY MATERIAL.
3. SLOPE OF SHOULDER INTO FACE OF RAIL NOT TO EXCEED 8:1.
4. RAISE REDWOOD PLANKING WHEN REQUIRED.
5. RAISING THE RAIL ELEMENT TO MAXIMUM HEIGHT REQUIRED BEFORE THE MINIMUM HEIGHT OF THE RAIL ELEMENT ABOVE GROUND LEVEL CAN BE REDUCED TO THE MINIMUM OF 26″.

RAIL ELEMENT RAISED



SPLICE LAP DETAIL

SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	NEW DRAWING. STD DWG BA 4E SPLIT INTO BA 4E1. AND BA 4E2.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

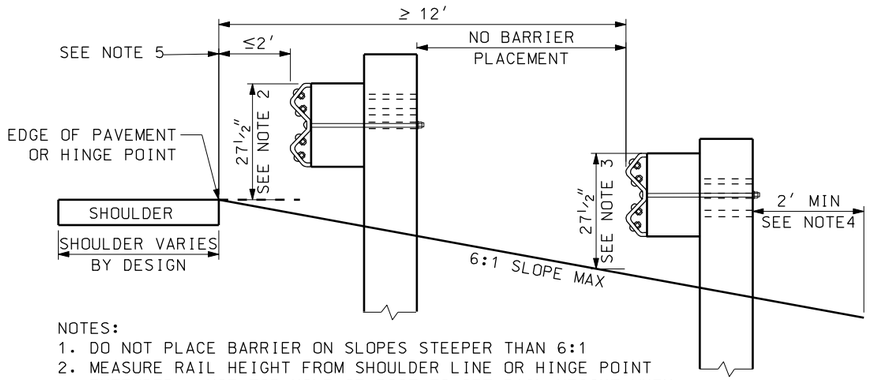
RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

W-BEAM GUARDRAIL INSTALLATIONS

STANDARD DRAWING TITLE

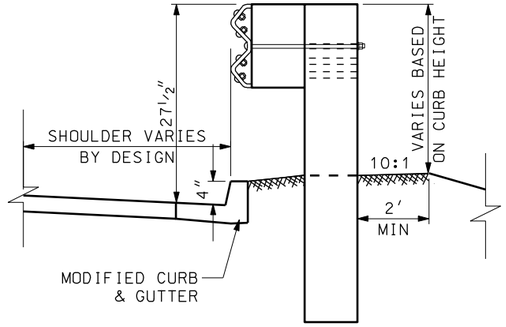
STD DWG
BA 4E1

DGN File:L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\x_Sup4Approved\BA04E1.dgn
02-DEC-2008



NOTES:
1. DO NOT PLACE BARRIER ON SLOPES STEEPER THAN 6:1
2. MEASURE RAIL HEIGHT FROM SHOULDER LINE OR HINGE POINT EXTENDED. USE TOP HOLE OF POST TO SET RAIL HEIGHT WHEN PAVEMENT SURFACE, TRAVEL LANES, ARE CONSTRUCTED WITH PORTLAND CEMENT CONCRETE PAVEMENT. USE BOTTOM HOLE OF POST TO SET RAIL HEIGHT WHEN PAVEMENT SURFACE, TRAVEL LANES, ARE CONSTRUCTED WITH HOT MIX ASPHALT (HMA).
3. MEASURE RAIL HEIGHT FROM GROUND LINE WHEN BARRIER IS PLACED 12 FEET OR GREATER FROM EDGE OF SHOULDER. USE CENTER BOLT HOLE FOR BLOCK AND RAIL ATTACHMENT.
4. USE 84 INCH POSTS IF THE 6:1 SLOPE CANNOT BE MAINTAINED 2 FEET BEHIND THE LINE POSTS.
5. WHEN ROADWAY DESIGN REQUIRES A 12′OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL.

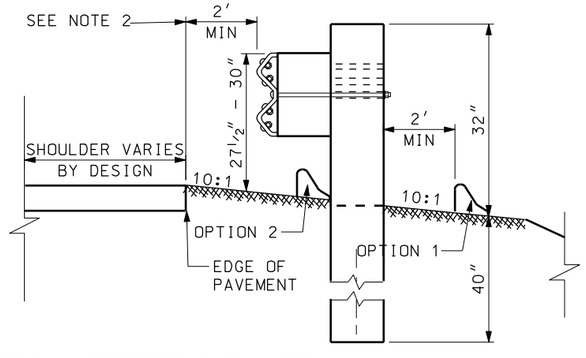
BARRIER INSTALLATION ON 6:1 SLOPE



SEE STD DWG BA 4S SERIES FOR SPECIFIC INSTALLATION REQUIREMENTS

INSTALLATION W/MODIFIED TYPE B1 CURB & GUTTER

USE 72″ LONG POST

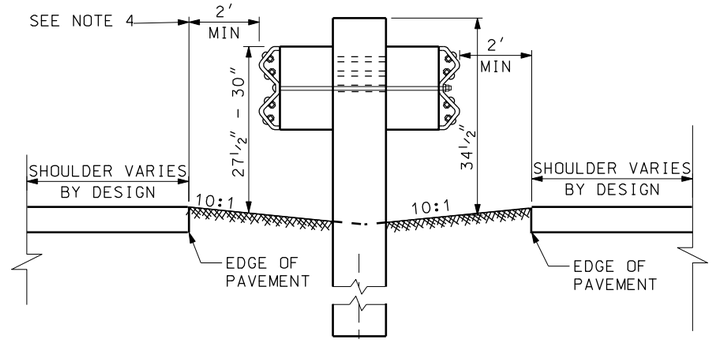


OPTION 1: PREFERRED INSTALLATION.

OPTION 2: PLACE FACE OF ASPHALT CONCRETE CURB BEHIND FACE OF RAIL. 2″ MAXIMUM CURB HEIGHT WHEN USED IN FRONT OF POST.

NOTE:
1. USE TOP HOLE OF POST TO SET RAIL HEIGHT WHEN PAVEMENT SURFACE, TRAVEL LANES, ARE CONSTRUCTED WITH PORTLAND CEMENT CONCRETE PAVEMENT. USE BOTTOM HOLE OF POST TO SET RAIL HEIGHT WHEN PAVEMENT SURFACE, TRAVEL LANES, ARE CONSTRUCTED WITH HOT MIX ASPHALT (HMA).
2. WHEN ROADWAY DESIGN REQUIRES A 12′OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL. (PLACE AS FAR OFF PAVEMENT AS PRACTICAL)

INSTALLATION W/ASPHALT CONCRETE CURB



NOTES:
1. IF MEDIAN BARRIER IS PLACED 10′ OR GREATER FROM TRAVEL LANES USE TOP HOLE TO MOUNT BLOCK & RAIL.
2. RAISE BOTH RAIL ELEMENTS AS PER RAIL ELEMENT RAISED DETAIL, WHEN REQUIRED.
3. ATTACH REQUIRED DELINEATION ON THE POST.
4. WHEN ROADWAY DESIGN REQUIRES A 12′OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL. (PLACE AS FAR OFF PAVEMENT AS PRACTICAL)

MEDIAN BARRIER

SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	NEW DRAWING. DETAILS MOVED FROM STD DWG BA4E.

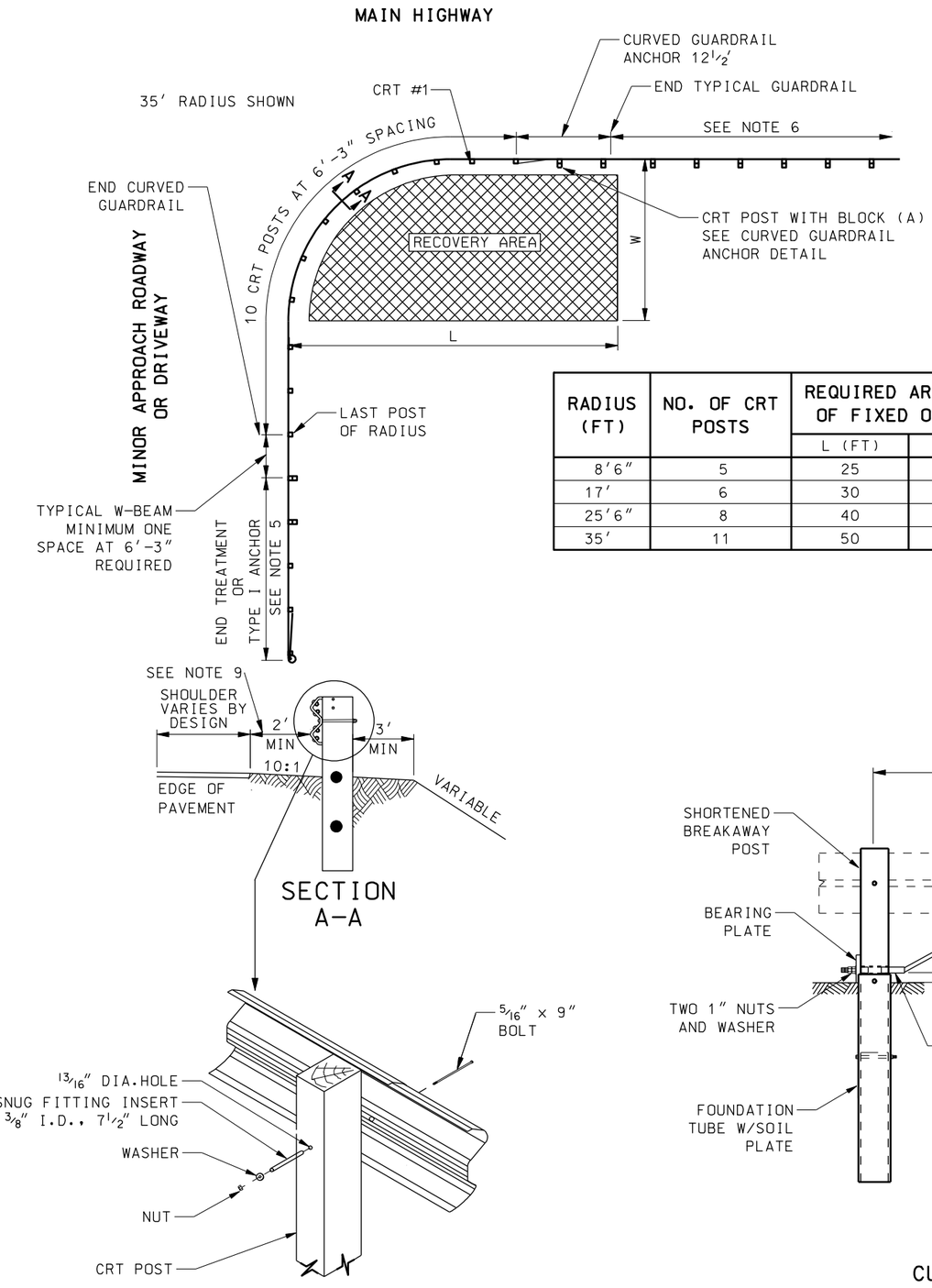
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

W-BEAM GUARDRAIL INSTALLATIONS

STANDARD DRAWING TITLE

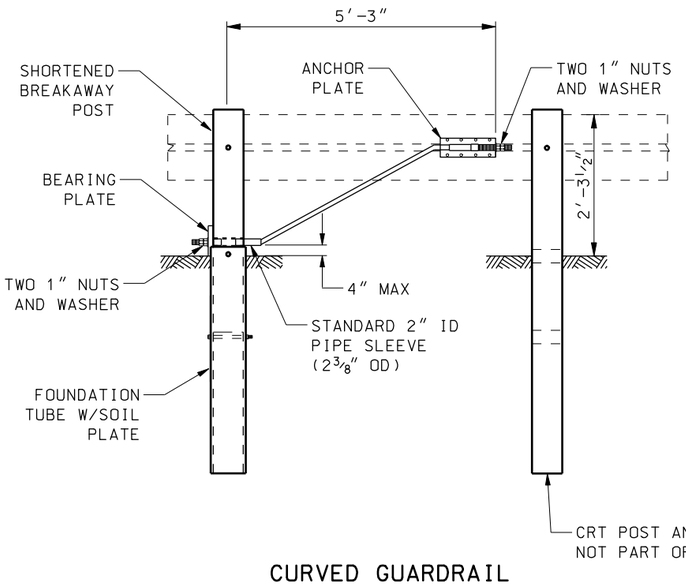
STD DWG
BA 4E2



RADIUS (FT)	NO. OF CRT POSTS	REQUIRED AREA FREE OF FIXED OBJECTS	
		L (FT)	W (FT)
8′6″	5	25	15
17′	6	30	15
25′6″	8	40	20
35′	11	50	20

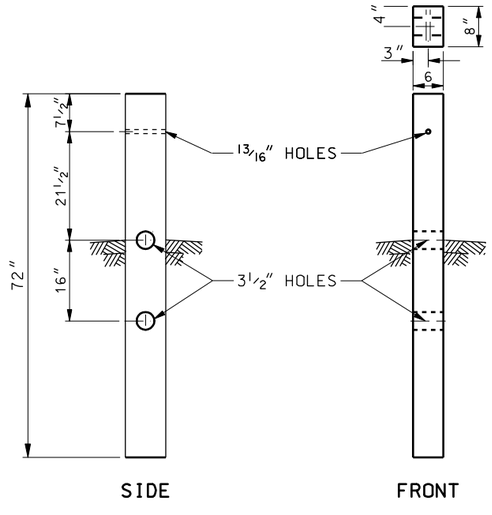
NOTES:

1. LIST RADIUS REQUIREMENT FOR EACH LOCATION IN THE PROJECT PLANS AND SUMMARY SHEET.
2. SHOP BEND RADIUS ELEMENTS. FIELD BENDING IS NOT PERMITTED.
3. RECOVERY AREA BEHIND THE GUARDRAIL TO BE MAINTAINED FREE OF FIXED OBJECTS.
4. MAINTAIN 10:1 SLOPE IN FRONT OF CURVED SECTION.
5. USE END TREATMENTS, TYPE "G" OR "H" ON INTERSECTING ROADWAYS OPEN TO THE GENERAL PUBLIC. USE ANCHOR TYPE I (REFER TO STD DWG BA 4D) ON BUSINESS/RESIDENTIAL DRIVEWAYS, OR RESTRICTED/LIMITED ENTRY ROADWAYS.
6. DO NOT ATTACH DIRECTLY TO W-BEAM GUARDRAIL TRANSITION, STD DWG BA 4B, INSTALL 12½ FEET OF TYPICAL W-BEAM GUARDRAIL AT END OF TRANSITION PRIOR TO INSTALLING CURVED GUARDRAIL ANCHOR.
7. USE ANCHOR TYPE I WHEN OPPOSING TRAFFIC IS 1.2 TIMES FROM THE REQUIRED CLEAR ZONE.
8. USE NOMINAL DIMENSIONS FOR ALL TIMBER.
9. WHEN ROADWAY DESIGN REQUIRES A 12′ OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL.



CURVED GUARDRAIL ANCHOR

(REFER TO STD DWG BA 4D)



CONTROLLED RELEASE TERMINAL (CRT) POST

SEE NOTE 7

SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	ADDED NOTE 9 AND SEVERAL EDITORIAL UPDATES.

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEPUTY DIRECTOR — OCT.30.2008 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — OCT.30.2008 DATE

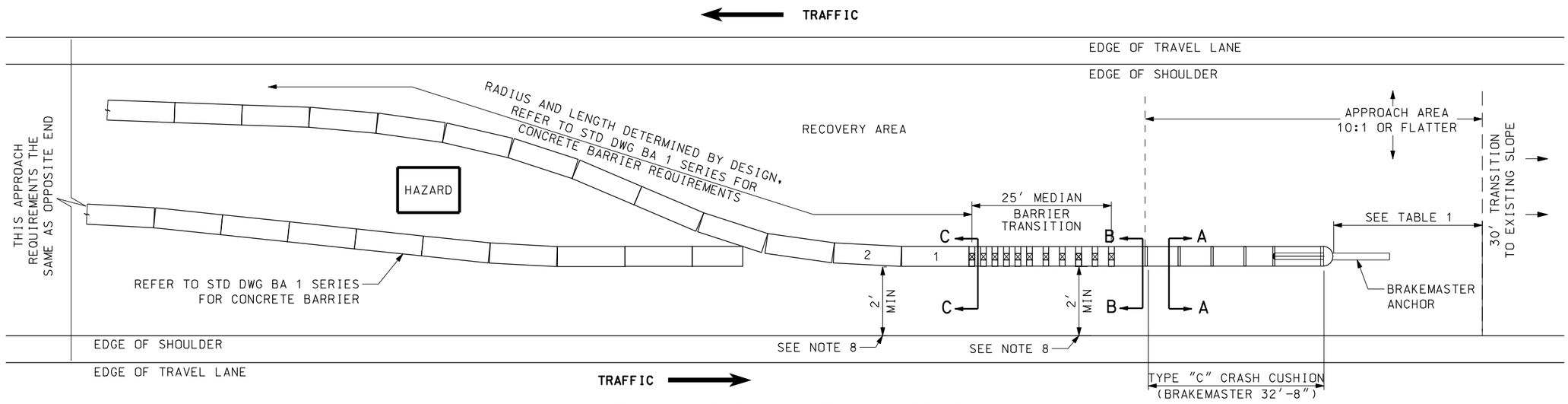
W-BEAM GUARDRAIL CURVE DETAILS

STANDARD DRAWING TITLE

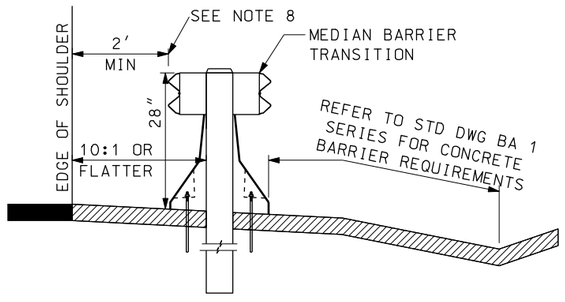
STD DWG BA 4L

DGN File:L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\xSupp4Approved\BA04L.dgn

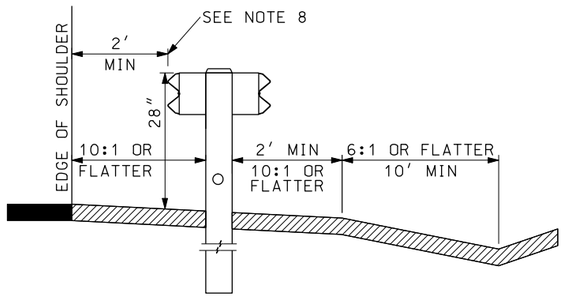
02-DEC-2008



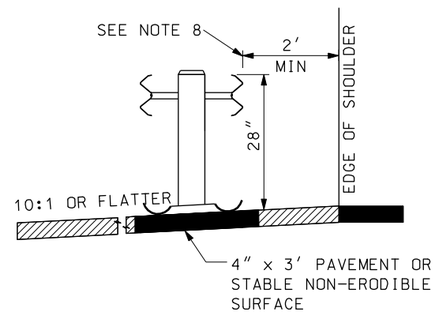
CONCRETE BARRIER INSTALLATION DETAIL



SECTION C–C
PIN BARRIER SECTION 1 AND 2
WITH STABILIZATION PINS



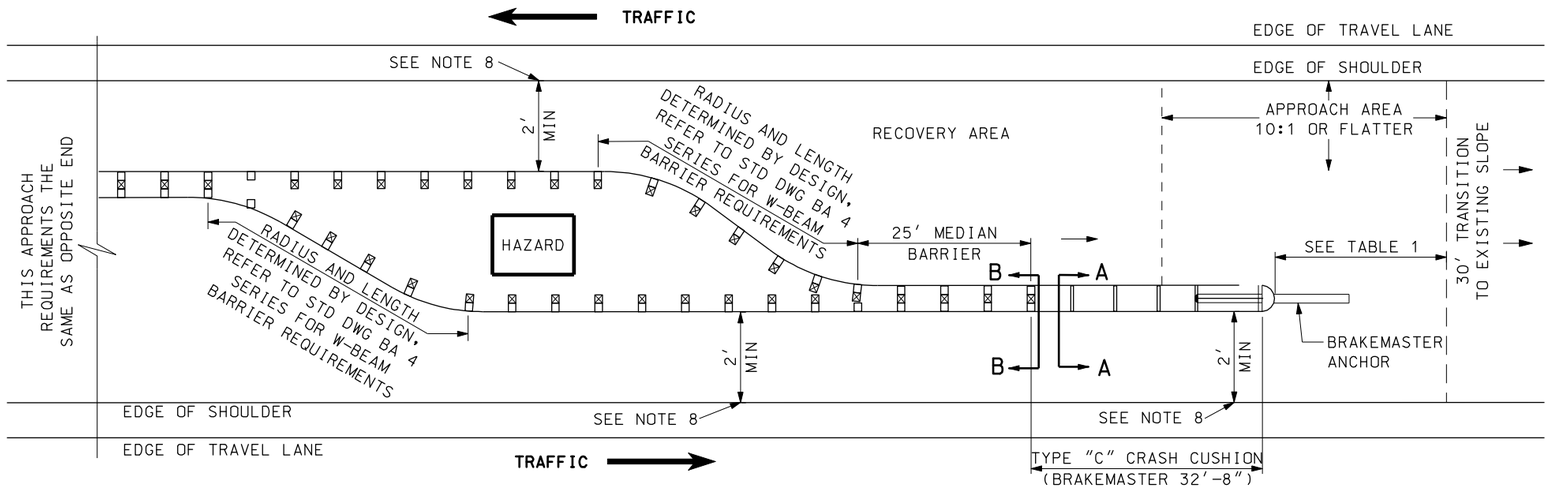
SECTION B–B
DRILL 2" HOLES IN MEDIAN BARRIER TRANSITION
OR MEDIAN BARRIER AS SPECIFIED BY MANUFACTURER



SECTION A–A

TABLE 1	
SPEED MPH	TAPER
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

W–BEAM GUARDRAIL BARRIER INSTALLATION DETAIL



NOTES:

1. THE BRAKEMASTER, MANUFACTURED BY ENERGY ABSORPTION SYSTEM. SEE UDOT'S GUIDELINES FOR SPECIFIC SYSTEM DETAILS.
2. INSTALL SYSTEMS AS PER UDOT'S AND MANUFACTURER'S SPECIFICATIONS.
3. HAVE SHOP DRAWING AVAILABLE ON SITE FOR REFERENCE DURING INSTALLATION.
4. USE 4" STABLE NON-ERODIBLE OR PAVED SURFACE FOR BRAKEMASTER SYSTEMS.
5. COMPLETE SLOPE PREPARATION PRIOR TO INSTALLING SYSTEM.
6. CLEAR RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA. SIGNS OR POLES PLACED IN THE RECOVERY AREA WILL BE BREAKAWAY AND BE A MINIMUM 10 FEET FROM SYSTEM RAIL ELEMENTS.
7. INSTALL REQUIRED MARKINGS AS PER STD DWG CC 1.
8. WHEN ROADWAY DESIGN REQUIRES A 12' OR WIDER EFFECTIVE SHOULDER THE 2'MIN BARRIER OFFSET IS OPTIONAL.

SUPPLEMENTAL DRAWING

REVISIONS				
NO.	DATE	APPR.	REMARKS	
1	10-30-08	MEE	ADDED NOTE 8 AND SEVERAL EDITORIAL UPDATES. REVISED TABLE 1. CHANGED NON-PERMEABLE TO STABLE NON-ERODIBLE.	

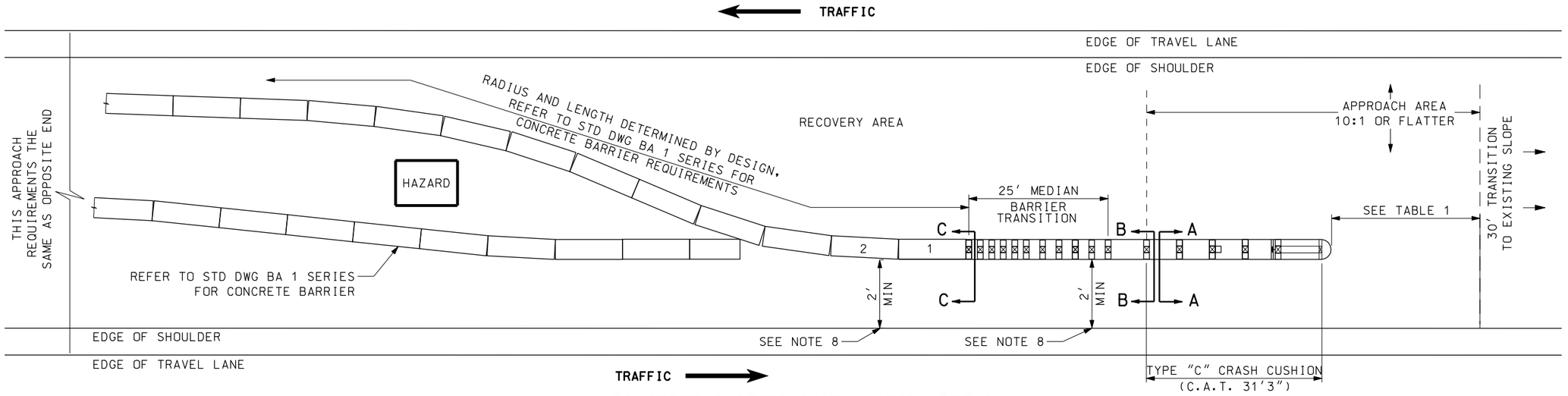
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DATE: OCT.30.2008
CHAIRMAN STANDARDS COMMITTEE
APPROVED — DATE: OCT.30.2008
DEPUTY DIRECTOR

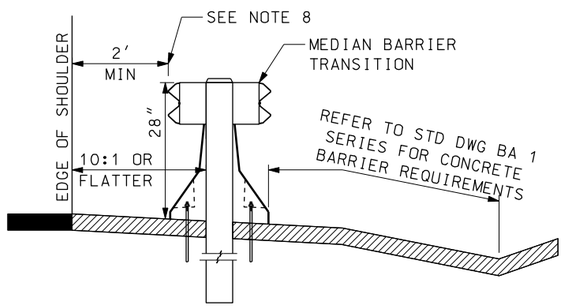
GRADING AND PLACEMENT DETAILS CRASH CUSHION TYPE C BRAKEMASTER
STANDARD DRAWING TITLE

STD DWG
CC 5A

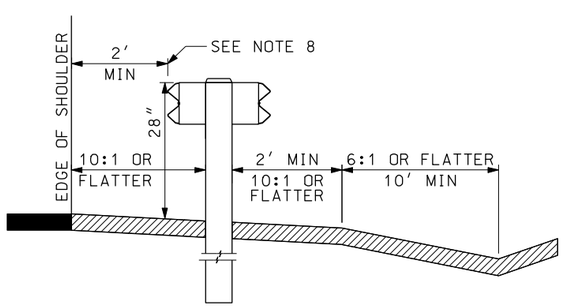
DGN Files\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\xSupp4Approved\CC05Adgn
02-DEC-2008



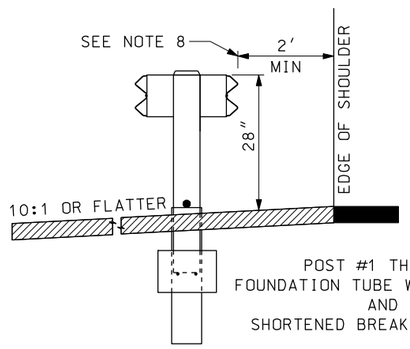
CONCRETE BARRIER INSTALLATION DETAIL



SECTION C-C
PIN BARRIER SECTION 1 AND 2
WITH STABILIZATION PINS



SECTION B-B

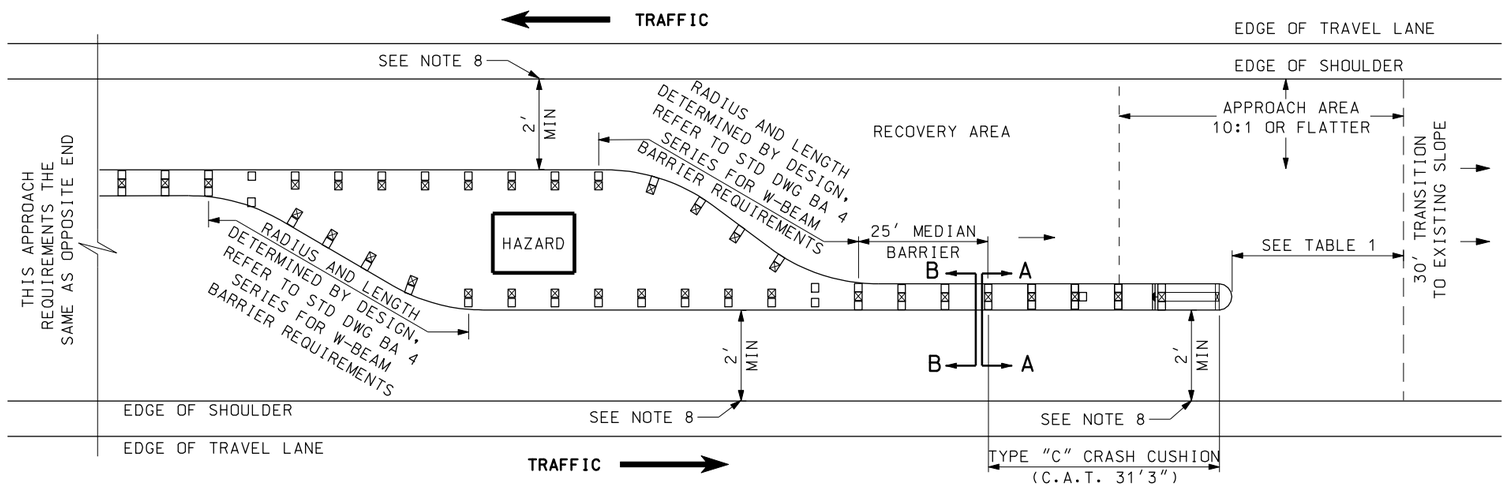


POST #1 THRU #6
FOUNDATION TUBE W/SOIL PLATE
AND
SHORTENED BREAKAWAY POSTS

SECTION A-A

TABLE 1	
SPEED MPH	TAPER
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

W-BEAM GUARDRAIL BARRIER INSTALLATION DETAIL



NOTES:

1. THE C.A.T., MANUFACTURED BY TRINITY INDUSTRIES. SEE UDOT'S GUIDELINES FOR CRASH CUSHIONS FOR SPECIFIC SYSTEM DETAILS.
2. INSTALL SYSTEMS AS PER UDOT'S AND MANUFACTURER'S SPECIFICATIONS.
3. HAVE SHOP DRAWING AVAILABLE ON SITE FOR REFERENCE DURING INSTALLATION.
4. USE GRADED AND COMPACTED SURFACE FOR C.A.T. SYSTEMS.
5. COMPLETE SLOPE PREPARATION PRIOR TO INSTALLING SYSTEM.
6. CLEAR RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA. SIGNS OR POLES PLACED IN THE RECOVERY AREA WILL BE BREAKAWAY AND BE A MINIMUM 10 FEET FROM SYSTEM RAIL ELEMENTS.
7. INSTALL REQUIRED MARKINGS AS PER STD DWG CC 1.
8. WHEN ROADWAY DESIGN REQUIRES A 12' OR WIDER EFFECTIVE SHOULDER THE 2'MIN BARRIER OFFSET IS OPTIONAL.

SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	ADDED NOTE 8 AND SEVERAL EDITORIAL UPDATES. REVISED TABLE 1.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEPUTY DIRECTOR — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — OCT.30.2008 DATE

GRADING AND PLACEMENT DETAILS CRASH CUSHION TYPE C C.A.T.
STANDARD DRAWING TITLE

STD DWG
CC 5B

DGN File:L:\Standard_Drawings\Imperial\2008Approved\v_Supplemental_Issues\vSupp4Approved\CC05b.dgn
02-DEC-2008

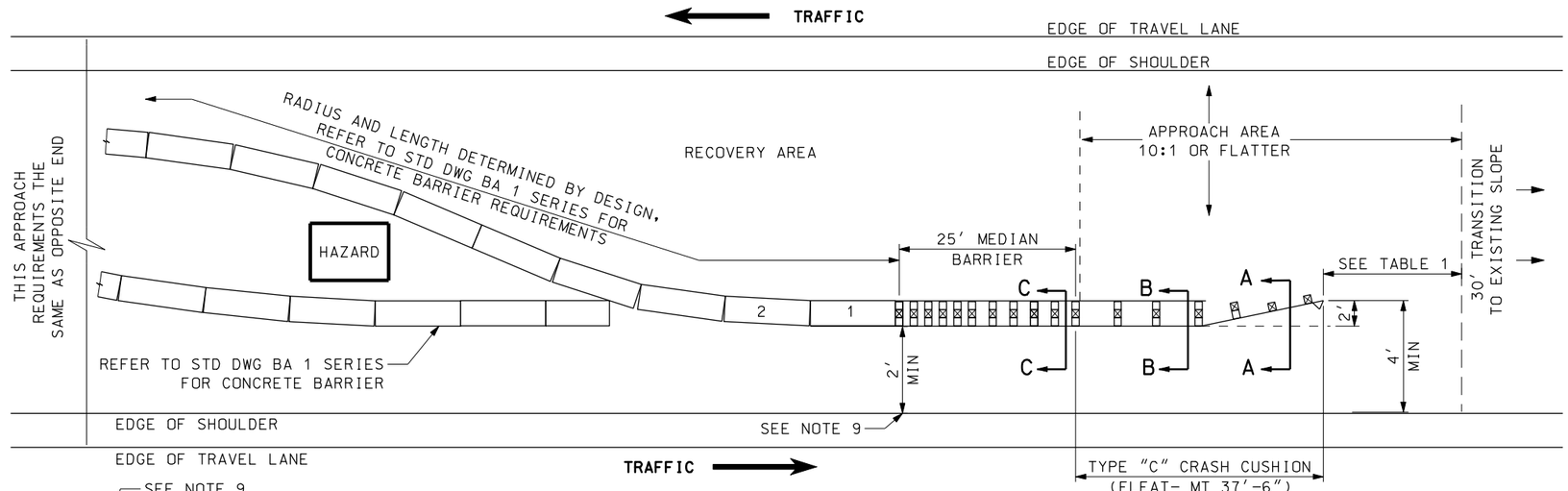
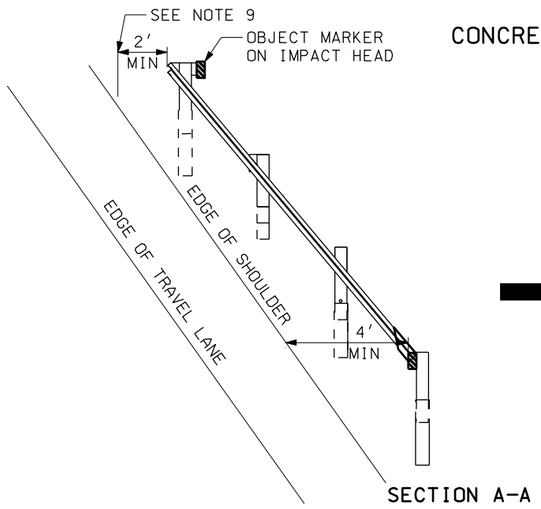
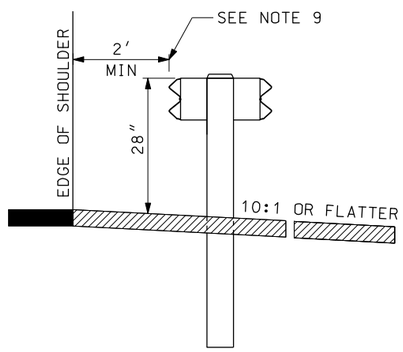


TABLE 1	
SPEED MPH	TAPER
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

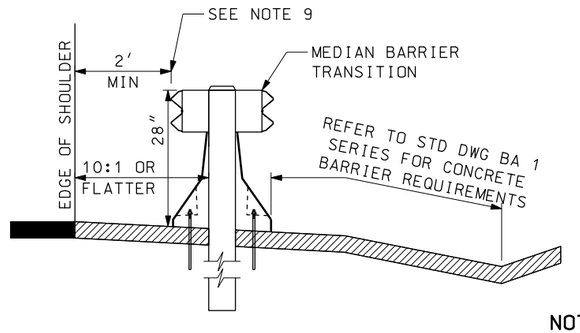
CONCRETE BARRIER INSTALLATION DETAIL



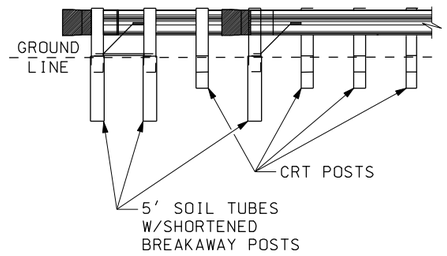
SECTION A–A



SECTION B–B

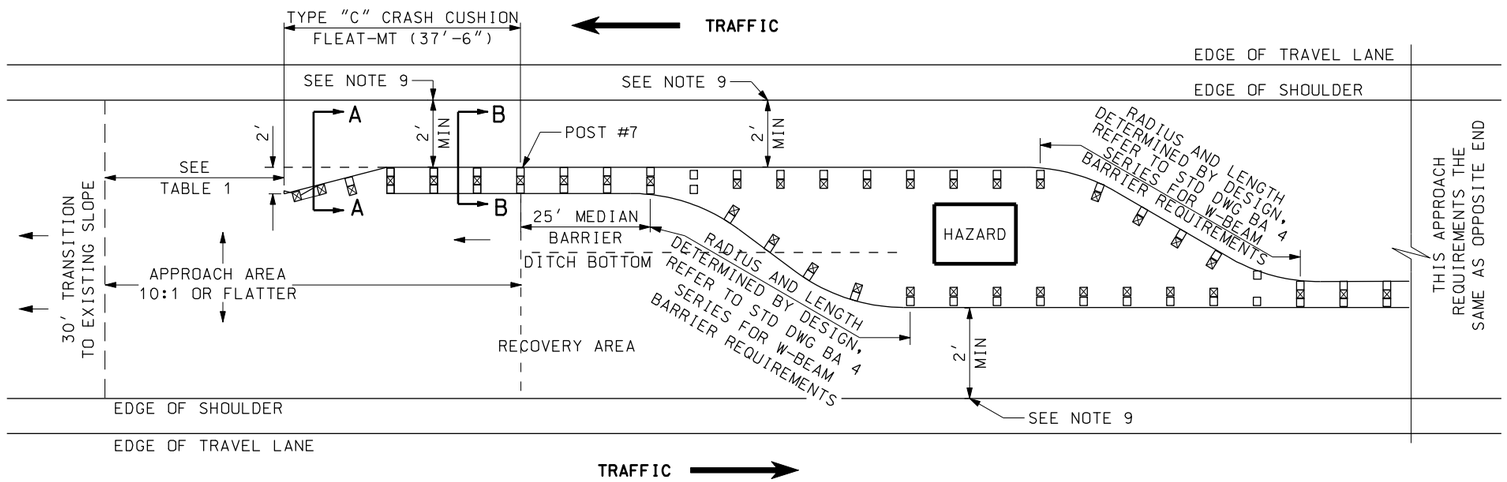


SECTION C–C
PIN BARRIER SECTION 1 AND 2
WITH STABILIZATION PINS



ELEVATION
WOOD POST OPTION SHOWN

W-BEAM GUARDRAIL BARRIER INSTALLATION DETAIL



NOTES:

1. THE FLEAT-MT, MANUFACTURED BY ROAD SYSTEMS INC. SEE UDOT'S GUIDELINES FOR SPECIFIC SYSTEM DETAILS.
2. INSTALL SYSTEMS AS PER UDOT'S AND MANUFACTURER'S SPECIFICATIONS.
3. REFER TO UDOT'S GUIDELINES FOR CRASH CUSHIONS FOR APPROVED POST OPTIONS.
4. HAVE SHOP DRAWING AVAILABLE ON SITE FOR REFERENCE DURING INSTALLATION.
5. USE GRADED AND COMPACT SURFACE FOR FLEAT-MT SYSTEMS.
6. COMPLETE SLOPE PREPARATION PRIOR TO INSTALLING SYSTEM.
7. CLEAR RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA. SIGNS OR POLES PLACED IN THE RECOVERY AREA WILL BE BREAKAWAY AND BE A MINIMUM 10 FEET FROM SYSTEM RAIL ELEMENTS.
8. INSTALL REQUIRED MARKINGS AS PER STD DWG CC 1 AND THIS DRAWING.
9. WHEN ROADWAY DESIGN REQUIRES A 12' OR WIDER EFFECTIVE SHOULDER THE 2' MIN BARRIER OFFSET IS OPTIONAL.

SUPPLEMENTAL DRAWING

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	ADDED NOTE 9 AND SEVERAL EDITORIAL UPDATES. REVISED TABLE 1.

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

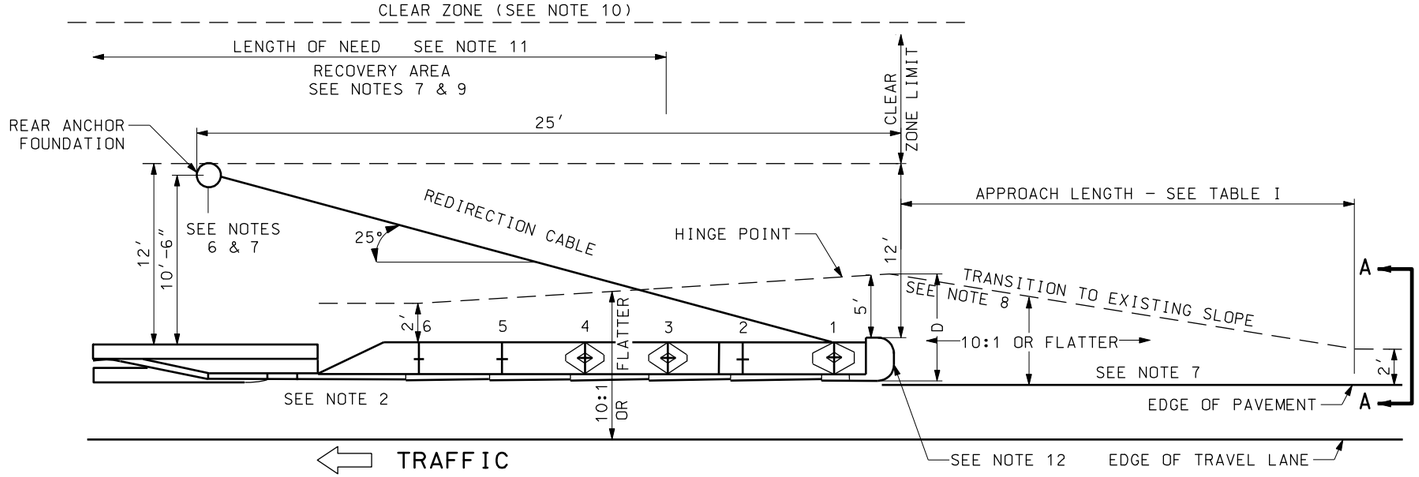
GRADING AND PLACEMENT DETAILS CRASH CUSHION TYPE C FLEAT-MT

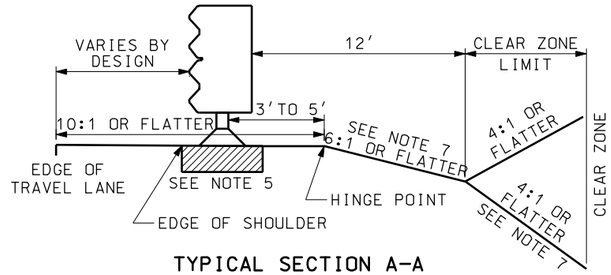
STANDARD DRAWING TITLE

STD DWG
CC 5C

DGN File:L:\Standard Drawings\Imperial\2008Approved\cc_Supplemental_Issues\cSupp4Approved\CC05C.dgn
02-DEC-2008

CRASH CUSHION TYPE F

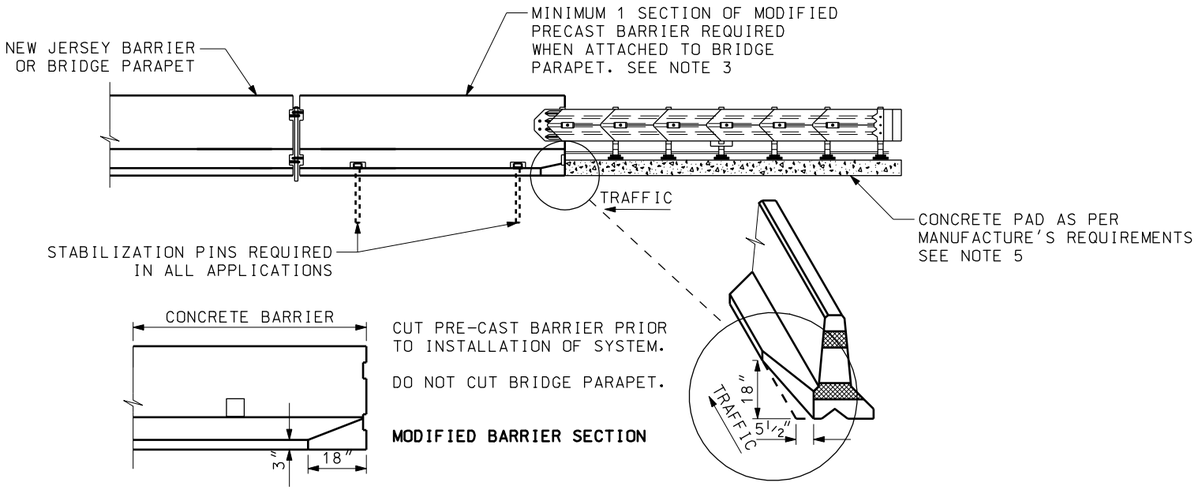




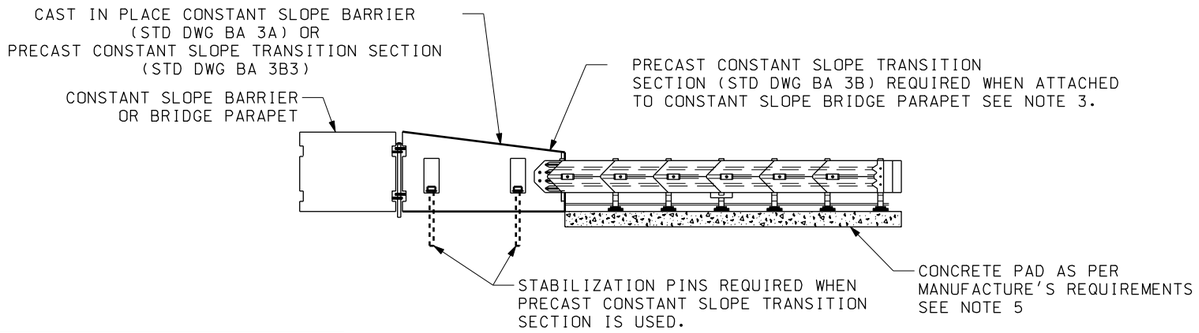
TYPICAL SECTION A-A

TABLE 1	
SPEED MPH	TAPER
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

D X TAPER= APPROACH LENGTH



USE THIS DETAIL WHEN SYSTEM IS INSTALLED WITH NEW JERSEY SHAPED BARRIER



SUPPLEMENTAL DRAWING

USE THIS DETAIL WHEN SYSTEM IS INSTALLED WITH CONSTANT SLOPE BARRIER

NOTES FOR CRASH CUSHION TYPE F

1. THE QUADTREND-350 IS MANUFACTURED BY ENERGY ABSORPTION SYSTEMS. SEE UDOT'S GUIDELINES FOR CRASH CUSHIONS FOR SPECIFIC SYSTEM DETAILS.
2. USE SYSTEM WHEN DIRECT ATTACHMENT TO BARRIER IS REQUIRED AND THE LONGITUDINAL SPACE IN FRONT OF THE HAZARD IS EQUAL TO THE REQUIRED MINIMUM LENGTH AS STATED IN TABLE 1. INSTALL SYSTEM AS PER UDOT'S AND MANUFACTURER'S SPECIFICATIONS.
3. CUT PRE-CAST NEW JERSEY BARRIER AS PER DETAIL, PRIOR TO INSTALLATION OF SYSTEM. SEAL CUT WITH THE SAME TYPE OF SEALER USED ON BARRIER. DO NOT CUT BRIDGE PARAPET.
   INSTALL 1 SECTION OF A PRECAST BARRIER, CUT AS PER DETAIL.
   INSTALL STABILIZATION PINS IN BARRIER SECTION.
   CONSTANT SLOPE BARRIER OR CONSTANT SLOPE BARRIER TRANSITION DOES NOT NEED MODIFICATION. THE REQUIRED BARRIER SECTIONS ARE A SEPARATE PAY ITEM FROM THE CRASH CUSHION.
4. HAVE SHOP DRAWING AVAILABLE ON SITE FOR REFERENCE DURING INSTALLATION.
5. INSTALL CONCRETE PAD AS PER MANUFACTURER'S REQUIREMENTS.
6. PLACE CABLE ANCHOR FOUNDATION IN SUCH A MANNER THAT THE REDIRECTING CABLE LAYS 6:1 OR FLATTER ON TOP OF THE GROUND, AND THE FOUNDATION WITH THE CABLE ANCHOR BRACKET ATTACHED DOES NOT EXCEED 4 INCHES ABOVE GROUND LEVEL. DO NOT BURY REDIRECTION CABLE.
7. COMPLETE SLOPE PREPARATION PRIOR TO INSTALLING SYSTEM.
   A. USE A 10:1 OR FLATTER SLOPE IN APPROACH AREA.
   B. A FORESLOPE AREA OF 12 FOOT x 25 FOOT AT 6:1 OR FLATTER REQUIRED FOR REAR ANCHOR FOUNDATION INSTALLATION
   C. USE A 4:1 OR FLATTER FORESLOPE IN RECOVERY AREA, AFTER REAR ANCHOR SLOPES HAVE BEEN ESTABLISHED
      1) IF A 4:1 FORESLOPE IS IMPRACTICAL USE A MAXIMUM 3:1 FORESLOPE IN RECOVERY AREA. ESTABLISH RECOVERY AREA AT THE TOE OF THE 3:1 FORESLOPE OF 4:1 OR FLATTER.
   D. USE OF 4:1 BACKSLOPE TO CLEAR ZONE LIMIT IN RECOVERY AREA PERMITTED ONLY AFTER THE REAR ANCHOR FORESLOPE S HAVE BEEN ESTABLISHED. IF A 4:1 BACKSLOPE IS IMPRACTICAL A 3:1 IS PERMITTED.
8. CONSTRUCT PLATFORM AS REQUIRED EVEN IF THE PLATFORM EXTENDS BEYOND THE CLEAR ZONE.
9. CLEAR THE RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS OR HAZARDS.
   A. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA.
   B. USE BREAKAWAY SIGNS OR POLES WHEN PLACED IN RECOVERY AREA. MAINTAIN A MINIMUM 10 FOOT CLEARANCE TO THE SIDES AND REAR OF SYSTEM.
10. ATTACH SAND CONTAINERS AT POSTS 1, 3 AND 4.
11. USE CURRENT EDITION OF ROADSIDE DESIGN GUIDE TO ESTABLISH CLEAR ZONE AND LENGTH OF NEED (LON) REQUIREMENTS.
12. INSTALL REQUIRED MARKING AS PER STD DWG CC 1.

REVISIONS				
NO.	DATE	APPR.	REMARKS	
1	10-30-08	MEE	REVISION NOTE 9 AND TABLE 1.	

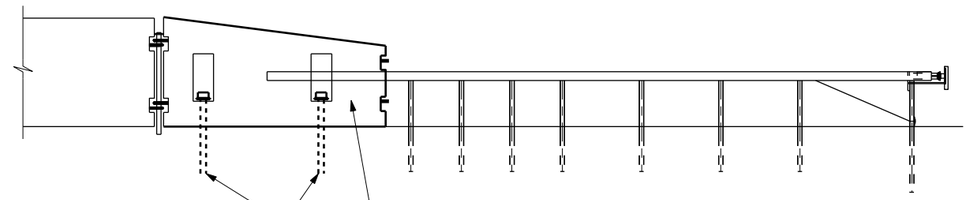
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEPUTY DIRECTOR — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — OCT.30.2008 DATE

GRADING AND INSTALLATION DETAILS
CRASH CUSHION TYPE F
QUAD TREND 350
STANDARD DRAWING TITLE

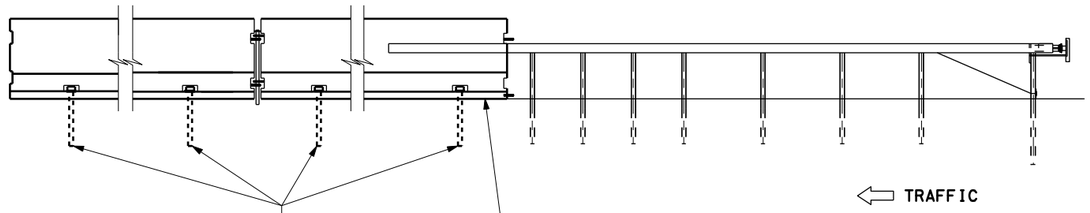
STD DWG
CC 7A

DGN File:L:\Standard.Drawings\Imperial\2008Approved\v.Supplemental.Issues\vSup4Approved\CC07A.dgn
02-DEC-2008



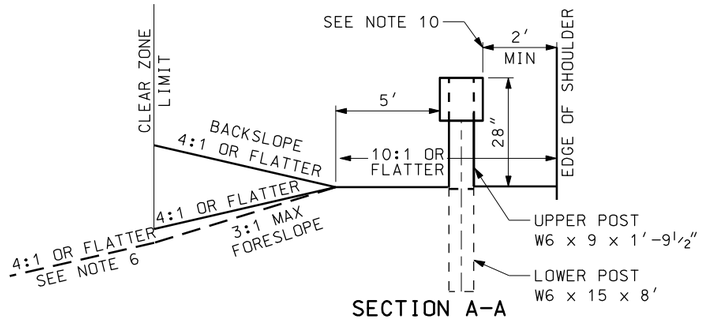
DETAIL WHEN SYSTEM IS INSTALLED WITH CONSTANT SLOPE BARRIER

(GROUND MOUNTED POST SHOWN, SURFACE MOUNTED STEEL BREAKAWAY POST ACCEPTABLE, SEE NOTE 5)

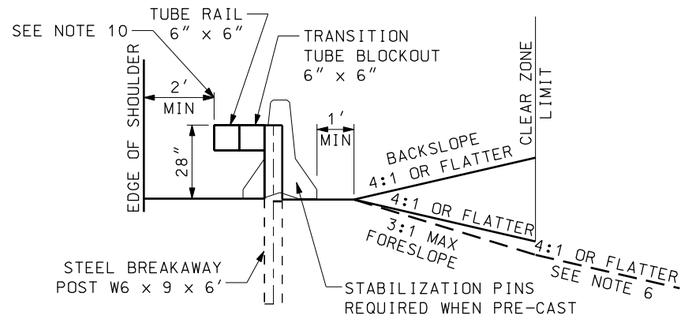


DETAIL WHEN SYSTEM IS INSTALLED WITH NEW JERSEY SHAPED BARRIER

(GROUND MOUNTED POST SHOWN, SURFACE MOUNTED STEEL BREAKAWAY POST ACCEPTABLE, SEE NOTE 5)

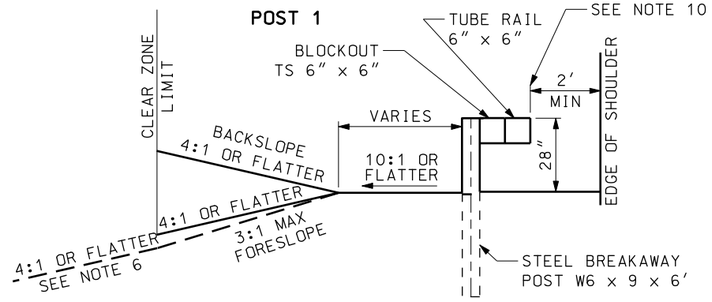


SECTION A–A



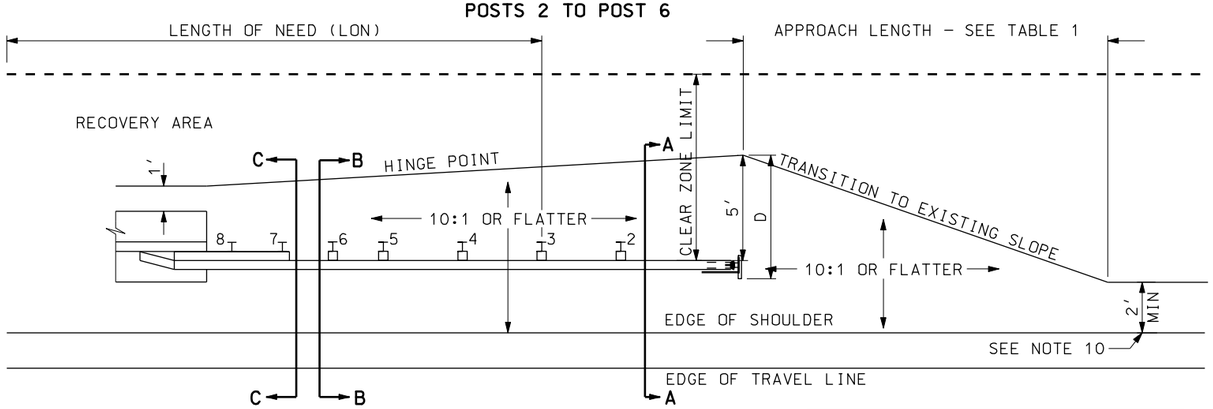
SECTION C–C

POSTS 7–8



SECTION B–B

POSTS 2 TO POST 6



SUPPLEMENTAL DRAWING

TABLE 1	
SPEED MPH	TAPER
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

D X TAPER= APPROACH LENGTH

NOTES FOR CRASH CUSHION TYPE F

1. THE BEAT-SSCC, MANUFACTURED BY ROAD SYSTEMS INC. SEE UDOT'S GUIDELINES FOR CRASH CUSHIONS FOR SPECIFIC SYSTEM DETAILS.
2. USE SYSTEM WHEN DIRECT ATTACHMENT TO BARRIER IS REQUIRED AND THERE IS LESS THAN 125 FEET OF LONGITUDINAL SPACE IN FRONT OF THE HAZARD. INSTALL SYSTEM AS PER UDOT'S AND MANUFACTURER'S SPECIFICATIONS.
3. ATTACH SYSTEM TRANSITION TO BARRIER OR BRIDGE PARAPET AS PER MANUFACTURER'S REQUIREMENTS.
4. HAVE SHOP DRAWING AVAILABLE ON SITE FOR REFERENCE DURING INSTALLATION.
5. THE BEAT-SSCC REQUIRES A GRADED AND COMPACTED SURFACE WHEN GROUND MOUNTED POSTS ARE USED. SURFACE MOUNTED POST OPTIONAL, USE MANUFACTURER'S SPECIFICATIONS FOR CONCRETE PAD, POSTS AND MOUNTING HARDWARE.
6. COMPLETE SLOPE PREPARATION PRIOR TO INSTALLING SYSTEM.
   A. USE 10:1 OR FLATTER SLOPES IN APPROACH AREA.
   B. USE 4:1 OR FLATTER FORESLOPE OR BACKSLOPE IN THE RECOVERY AREA.
      1) IF A 4:1 FORESLOPE IN RECOVERY AREA IS IMPRACTICAL USE A RECOVERY AREA AT THE TOE OF THE 3:1 FORESLOPE OF 4:1 OR FLATTER.
      2) MAXIMUM 4:1 BACKSLOPE TO THE CLEAR ZONE LIMIT IN THE RECOVERY AREA.
7. CLEAR RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS OR HAZARDS.
   A. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA.
   B. USE BREAKAWAY SIGNS OR POLES WHEN PLACED IN RECOVERY AREA. MAINTAIN A MINIMUM 10 FOOT CLEARANCE TO SYSTEM.
8. INSTALL REQUIRED MARKING AS PER STD DWG CC 1, TYPE G.
9. REFER TO THE CURRENT EDITION OF THE AASHTO ROADSIDE DESIGN GUIDE TO DETERMINE LENGTH OF NEED (LON) AND CLEAR ZONE REQUIREMENTS.
10. WHEN ROADWAY DESIGN REQUIRES A 12′ OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/24/08	GS	ADDED MISSING INFORMATION.
2	10/30/08	MEE	ADDED ADDED NOTE 10 AND DETAILS REARRANGED. REVISED NOTE 7 AND TABLE 1 AND SEVERAL EDITORIAL UPDATES.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

CRASH CUSHION TYPE F BEAT-SSCC
STANDARD DRAWING TITLE

STD DWG
CC 7B

DGN File:L:\Standard_Drawings\Imperial\2008Approved\v_Supplemental_Issues\vSupp4Approved\CC07B.dgn
02-DEC-2008

CRASH CUSHION TYPE G

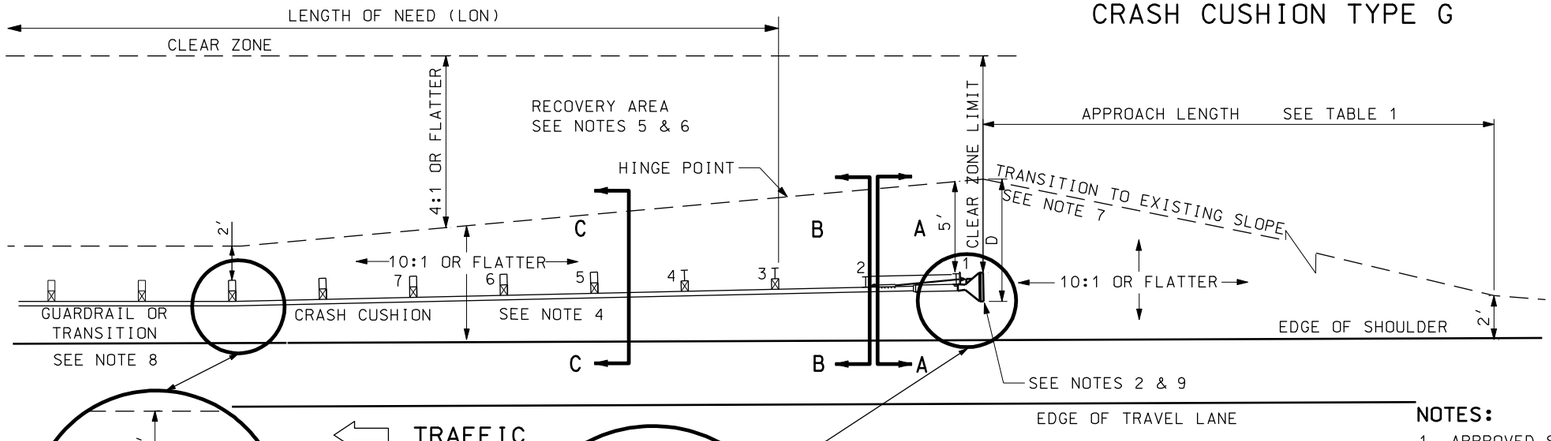
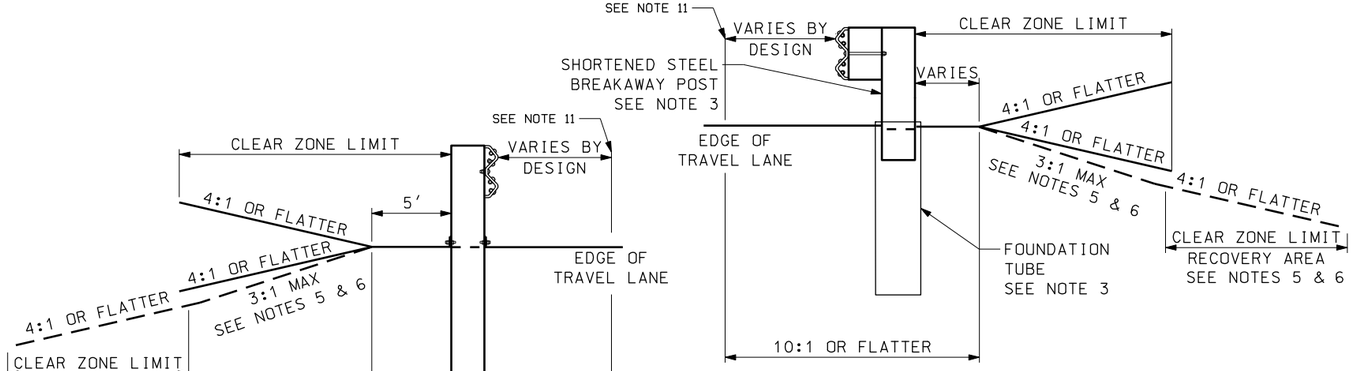
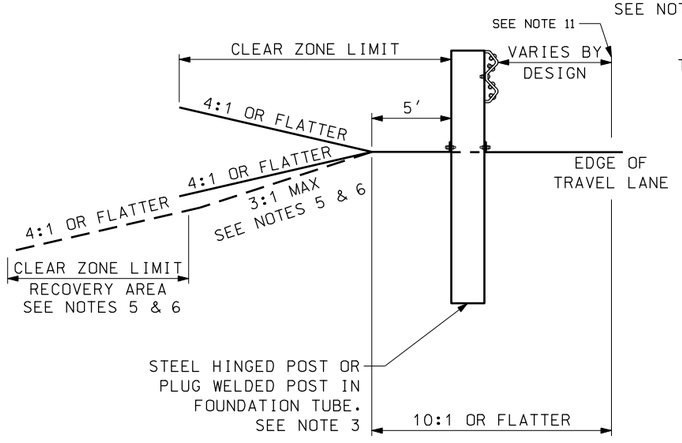


TABLE 1	
SPEED MPH	TAPER
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

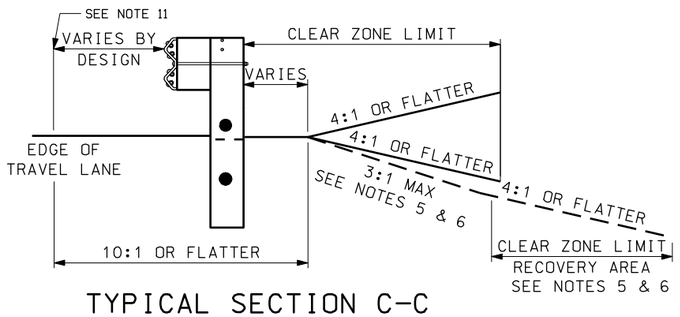
D X TAPER= APPROACH LENGTH



TYPICAL SECTION B-B
POSTS 2-4



TYPICAL SECTION A-A
POST 1
SEE NOTE 3



TYPICAL SECTION C-C
POSTS 5-8
SEE NOTE 3

SUPPLEMENTAL DRAWING

NOTES:

1. APPROVED SYSTEMS: ET-2000 AND ET-PLUS MANUFACTURED BY TRINITY INDUSTRIES AND THE SKT-350, MANUFACTURED BY ROAD SYSTEMS INC. REFER TO UDOT'S GUIDELINES FOR CRASH CUSHIONS AND END TREATMENTS FOR SPECIFIC SYSTEM DETAILS.

2. SYSTEM OFFSET:
   A. INSTALL SYSTEM WITH 2 FOOT OFFSET (25:1 FLARE RATE) WHEN USED WITH A TANGENT BARRIER SYSTEM.
   B. INSTALL SYSTEM AT THE SAME FLARE RATE AS THE BARRIER IT IS BEING ATTACHED TO.

3. REFER TO UDOT'S GUIDELINES FOR CRASH CUSHION AND END TREATMENTS FOR POST REQUIREMENTS.
   A. POST 1
      1) ET SERIES-HINGE BREAKAWAY POST (HBA)
      2) SKT-350 PLUG WELDED POST INSIDE FOUNDATION TUBE

4. RAIL ELEMENTS
   A. USE 12½ FOOT RAIL ELEMENTS AS SPECIFIED BY THE SYSTEM MANUFACTURER.
   B. DO NOT BOLT RAIL ELEMENT AT POST 1.
   C. REFER TO MANUFACTURE SPECIFICATIONS FOR OTHER RAIL TO POST BOLT REQUIREMENTS.

5. COMPLETE SLOPE PREPARATION PRIOR TO INSTALLING SYSTEM.
   A. USE 10:1 OR FLATTER SLOPES IN APPROACH AREA.
   B. USE 4:1 OR FLATTER FORESLOPE OR BACKSLOPE IN THE RECOVERY AREA.
      1) IF A 4:1 FORESLOPE IN RECOVERY AREA IS IMPRACTICAL USE A MAXIMUM 3:1 FORESLOPE. ESTABLISH A RECOVERY AREA AT THE TOE OF THE 3:1 FORESLOPE OF 4:1 OR FLATTER.
   C. USE A 4:1 BACKSLOPE TO THE CLEAR ZONE LIMIT IN THE RECOVERY AREA. IF A 4:1 BACKSLOPE CANNOT BE ESTABLISHED A 3:1 BACKSLOPE IS PERMITTED.

6. CLEAR RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS OR HAZARDS.
   A. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA.
   B. USE BREAKAWAY SIGNS OR POLES WHEN PLACED IN RECOVERY AREA, AND MAINTAIN A MINIMUM 10 FOOT CLEARANCE TO THE SIDES AND REAR OF THE SYSTEM.

7. CONSTRUCT PLATFORM AS REQUIRED WHEN THE SPACE IS AVAILABLE EVEN IF THE PLATFORM EXTENDS BEYOND THE CLEAR ZONE REQUIREMENTS. SEE STD DWG CC8B FOR EXCEPTIONS.

8. USE GUARDRAIL TRANSITION, STD DWG BA 4 SERIES, WHEN ATTACHING SYSTEM TO CONCRETE BARRIER OR BRIDGE PARAPET.

9. INSTALL REQUIRED MARKINGS AS PER STD DWG CC 1.

10. USE THE CURRENT EDITION, ROADSIDE DESIGN GUIDE TO ESTABLISH CLEAR ZONE REQUIREMENT AND LENGTH OF NEED (LON) REQUIREMENTS.

11. WHEN ROADWAY DESIGN REQUIRES A 12' OR WIDER EFFECTIVE SHOULDER THE 2' MIN BARRIER OFFSET IS OPTIONAL.

REVISIONS					
NO.	DATE	APPR.	REMARKS		
1	10-30-08	MEE	ADDED NOTE 11, REVISION NOTE 6 AND TABLE 1.		

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

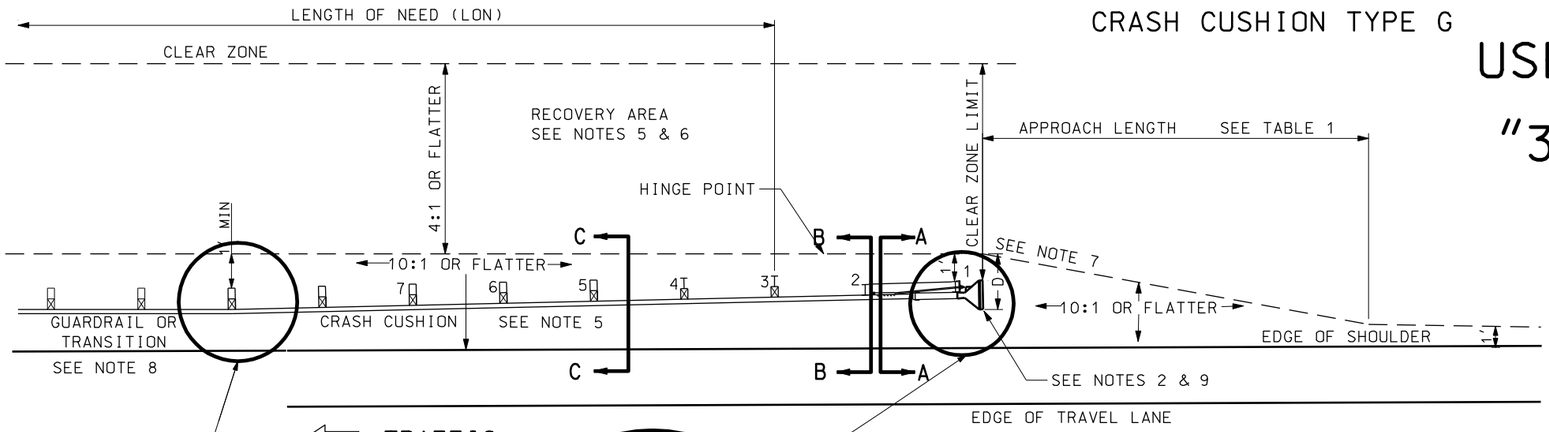
GRADING AND INSTALLATION DETAILS CRASH CUSHION TYPE G
STANDARD DRAWING TITLE

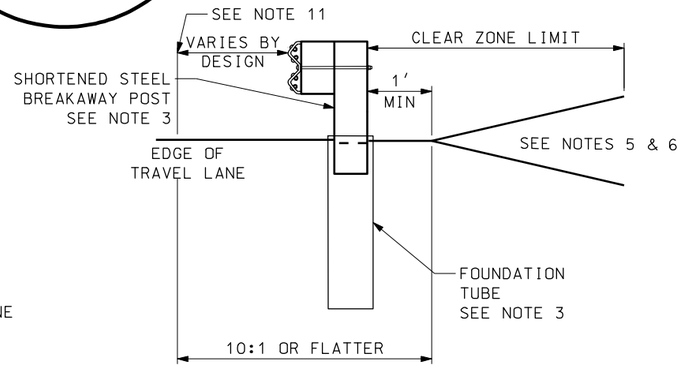
STD DWG
CC 8A

DGN File: L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\xSupp4Approved\CC08A.dgn
02-DEC-2008

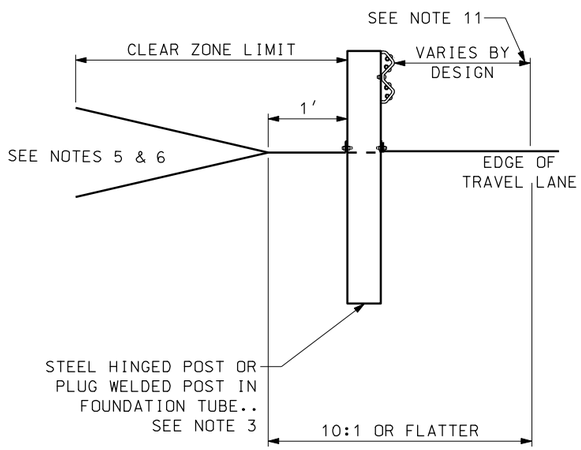
CRASH CUSHION TYPE G

USE THIS DETAIL FOR "3R" PROJECTS ONLY

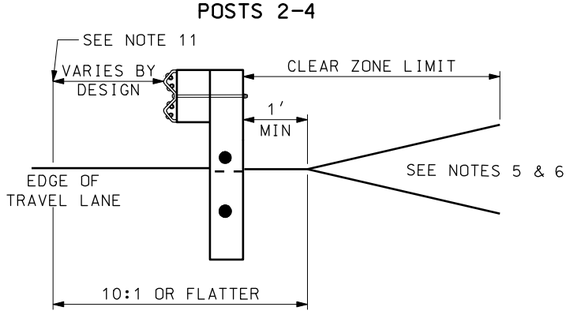




TYPICAL SECTION B–B
POSTS 2–4



TYPICAL SECTION A–A
POST 1
SEE NOTE 3



TYPICAL SECTION C–C
POSTS 5–8
SEE NOTE 3

TABLE 1	
SPEED MPH	TAPER
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

D X TAPER= APPROACH LENGTH

NOTES:

1. APPROVED SYSTEMS: ET-2000 AND ET-PLUS MANUFACTURED BY TRINITY INDUSTRIES AND THE SKT-350, MANUFACTURED BY ROAD SYSTEMS INC. REFER TO UDOT'S GUIDELINES FOR CRASH CUSHIONS AND END TREATMENTS FOR SPECIFIC SYSTEM DETAILS.

2. SYSTEM OFFSET:
   A. INSTALL SYSTEM WITH 2 FOOT OFFSET (25:1 FLARE RATE) WHEN USED WITH A TANGENT BARRIER SYSTEM.
   B. INSTALL SYSTEM AT THE SAME FLARE RATE AS THE BARRIER INSTALLATION SYSTEM IS BEING ATTACHED TO.

3. POST OPTIONS: REFER TO UDOT'S GUIDELINES FOR CRASH CUSHION FOR APPROVED POST OPTIONS.
   A. POST 1
      1) ET SERIES-HINGE BREAKAWAY POST (HBA)
      2) SKT-350 PLUG WELDED POST INSIDE FOUNDATION TUBE.

4. RAIL ELEMENTS
   A. USE 12½ FOOT RAIL ELEMENTS AS SPECIFIED BY THE SYSTEM MANUFACTURER.
   B. DO NOT BOLT RAIL ELEMENT TO POST 1.
   C. REFER TO MANUFACTURER SPECIFICATIONS FOR OTHER RAIL TO POST BOLT REQUIREMENTS.

5. COMPLETE SLOPE PREPARATIONS PRIOR TO INSTALLING SYSTEM.
   A. USE 10:1 OR FLATTER SLOPES IN APPROACH AREAS.
   B. CONSTRUCT RECOVERY AREA SLOPE AS PER CC 8A WHEN CONDITIONS PERMIT. CONSULT ENGINEER FOR ALLOWABLE SLOPES WHEN SLOPE REQUIREMENTS OF CC 8A CANNOT BE MET.

6. CLEAR RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS OR HAZARDS.
   A. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA.
   B. USE BREAKAWAY SIGNS OR POLES WHEN PLACED IN RECOVERY AREA, AND MAINTAIN A MINIMUM 10 FOOT CLEARANCE TO THE SIDES AND REAR OF THE SYSTEM.

7. CONSTRUCT PLATFORM AS REQUIRED EVEN IF THE PLATFORM EXTENDS BEYOND THE CLEAR ZONE REQUIREMENT.

8. USE GUARDRAIL TRANSITION, STD DWG BA 4 SERIES, WHEN ATTACHING SYSTEM TO CONCRETE BARRIER OR BRIDGE PARAPET.

9. INSTALL REQUIRED MARKINGS AS PER STD DWG CC 1.

10. USE THE CURRENT EDITION, ROADSIDE DESIGN GUIDE TO ESTABLISH CLEAR ZONE REQUIREMENT AND LENGTH OF NEED (LON) REQUIREMENTS.

11. WHEN ROADWAY DESIGN REQUIRES A 12′ OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL.

SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	ADDED NOTE 11, REVISION NOTE 6 AND TABLE 1. AND SEVERAL EDITORIAL UPDATES.

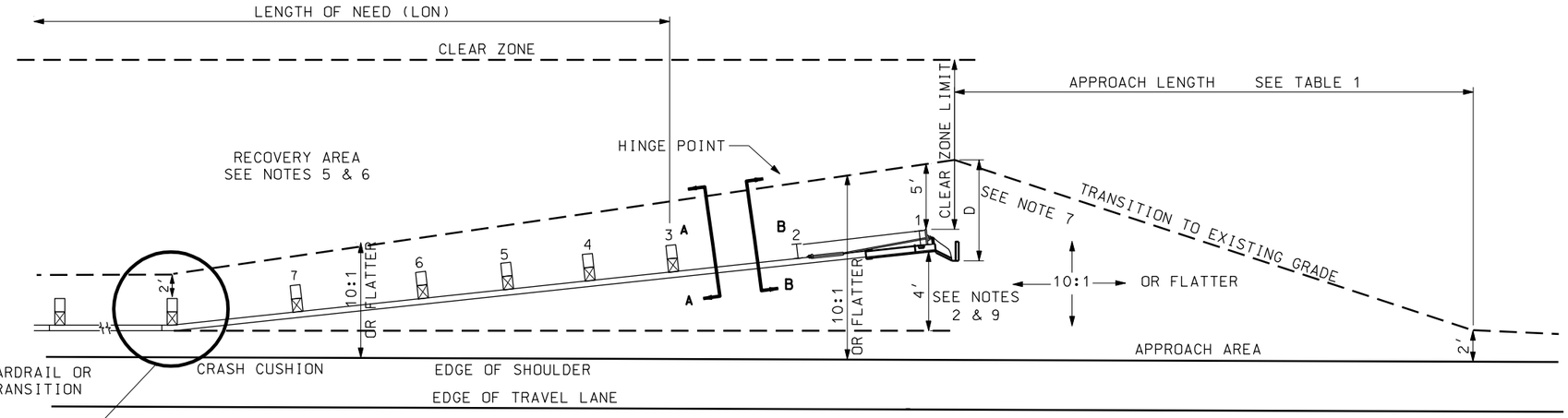
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

GRADING AND INSTALLATION DETAILS FOR "3R" PROJECTS CRASH CUSHION TYPE G

STANDARD DRAWING TITLE

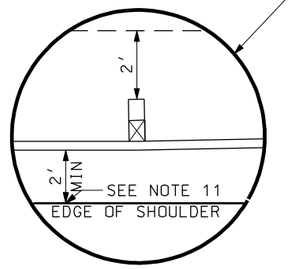
STD DWG
CC 8B

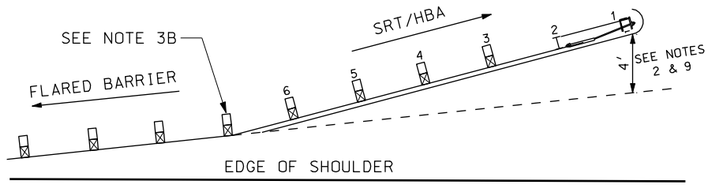


FLEAT – 350 / SRT/HBA

WOOD/STEEL POST
SEE NOTES 2, 3 & 8

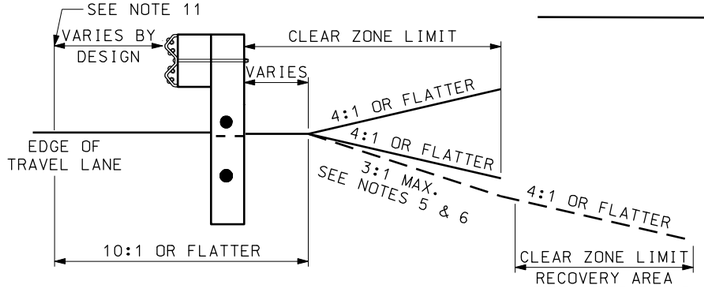
SEE NOTES 2, 3 & 8





SRT/HBA WITH FLARED BARRIER

SEE NOTE 2 C

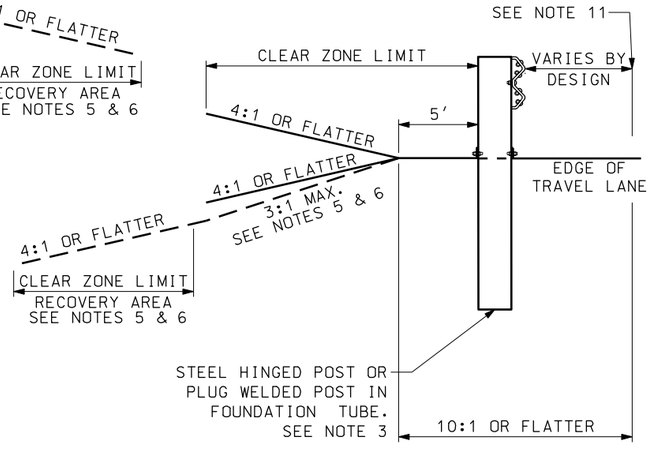


TYPICAL SECTION A–A

POSTS 3–8

TABLE 1	
SPEED MPH	**TAPER**
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

D X TAPER= APPROACH LENGTH



TYPICAL SECTION B–B

POSTS 1–2
SEE NOTE 3

SUPPLEMENTAL DRAWING

TRAFFIC

NOTES:

1. APPROVED SYSTEMS: FLEAT 350, MANUFACTURED BY ROAD SYSTEMS, INC. AND SRT/HBA MANUFACTURED BY TRINITY INDUSTRIES REFER TO UDOT'S GUIDELINES FOR CRASH CUSHIONS AND END TREATMENTS FOR SPECIFIC SYSTEM DETAILS.

2. SYSTEM OFFSET:
   A. INSTALL SYSTEM WITH A 4 FOOT OFFSET WHEN USED WITH A TANGENT BARRIER SYSTEM.
   B. FLEAT–350: INSTALL AT THE SAME FLARE RATE AS THE BARRIER INSTALLATION.
   C. SRT/HBA: INSTALL SYSTEM WITH A 4 FOOT OFFSET, FROM THE FLARED BARRIER EXTENDED.

3. POST OPTIONS: REFER TO UDOT'S GUIDELINES FOR CRASH CUSHIONS FOR APPROVED POST OPTIONS.
   A. POSTS 1 AND 2
      1) FLEAT–350 PLUG WELDED POSTS SET INSIDE 6' FOUNDATION TUBES.
      2) SRT/HBA HINGE BREAKAWAY POSTS.
   B. SRT/HBA: THE LAST POST OF THE GUARDRAIL INSTALLATION OR THE GUARDRAIL TRANSITION ELEMENT (POST #11) WILL BE SUBSTITUTED WITH A CRT POST AS PER MANUFACTURER'S REQUIREMENTS.

4. USE 12½ FOOT RAIL SECTIONS (3 EACH SECTIONS), SLOTTED AS PER MANUFACTURER'S REQUIREMENTS.

5. COMPLETE SLOPE PREPARATION PRIOR TO INSTALLING SYSTEM.
   A. USE 10:1 OR FLATTER SLOPES IN APPROACH AREA.
   B. USE 4:1 OR FLATTER FORESLOPE OR BACKSLOPE IN THE RECOVERY AREA.
      1) IF A 4:1 FORESLOPE IN RECOVERY AREA IS IMPRACTICAL USE A MAXIMUM 3:1 FORESLOPE. ESTABLISH A RECOVERY AREA AT THE TOE OF THE 3:1 FORESLOPE OF 4:1 OR FLATTER.
   C. USE A 4:1 BACKSLOPE TO THE CLEAR ZONE LIMIT IN THE RECOVERY AREA IF A 4:1 CANNOT BE ESTABLISHED A 3:1 IS PERMITTED.

6. CLEAR RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS OR HAZARDS.
   A. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA.
   B. USE BREAKAWAY SIGNS OR POLES WHEN PLACED IN RECOVERY AREA, AND MAINTAIN A MINIMUM 10 FOOT CLEARANCE TO THE SIDES AND REAR OF SYSTEM.

7. CONSTRUCT PLATFORM AS REQUIRED EVEN IF THE PLATFORM EXTENDS BEYOND THE CLEAR ZONE REQUIREMENTS.

8. USE GUARDRAIL TRANSITION, STD DWG BA 4 SERIES, WHEN ATTACHING THE SYSTEM TO CONCRETE BARRIER OR BRIDGE PARAPET.
   A. SRT/HBA: REPLACE THE LAST POST OF THE TRANSITION WITH A CRT POST. SEE NOTE 3.

9. INSTALL REQUIRED MARKINGS AS PER STD DWG CC 1.

10. USE THE CURRENT ROADSIDE DESIGN GUIDE TO ESTABLISH CLEAR ZONE REQUIREMENT AND LENGTH OF NEED (LON) REQUIREMENTS.

11. WHEN ROADWAY DESIGN REQUIRES A 12' OR WIDER EFFECTIVE SHOULDER THE 2' MIN BARRIER OFFSET IS OPTIONAL.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	ADDED NOTE 11, REVISION NOTE 6 AND TABLE 1.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

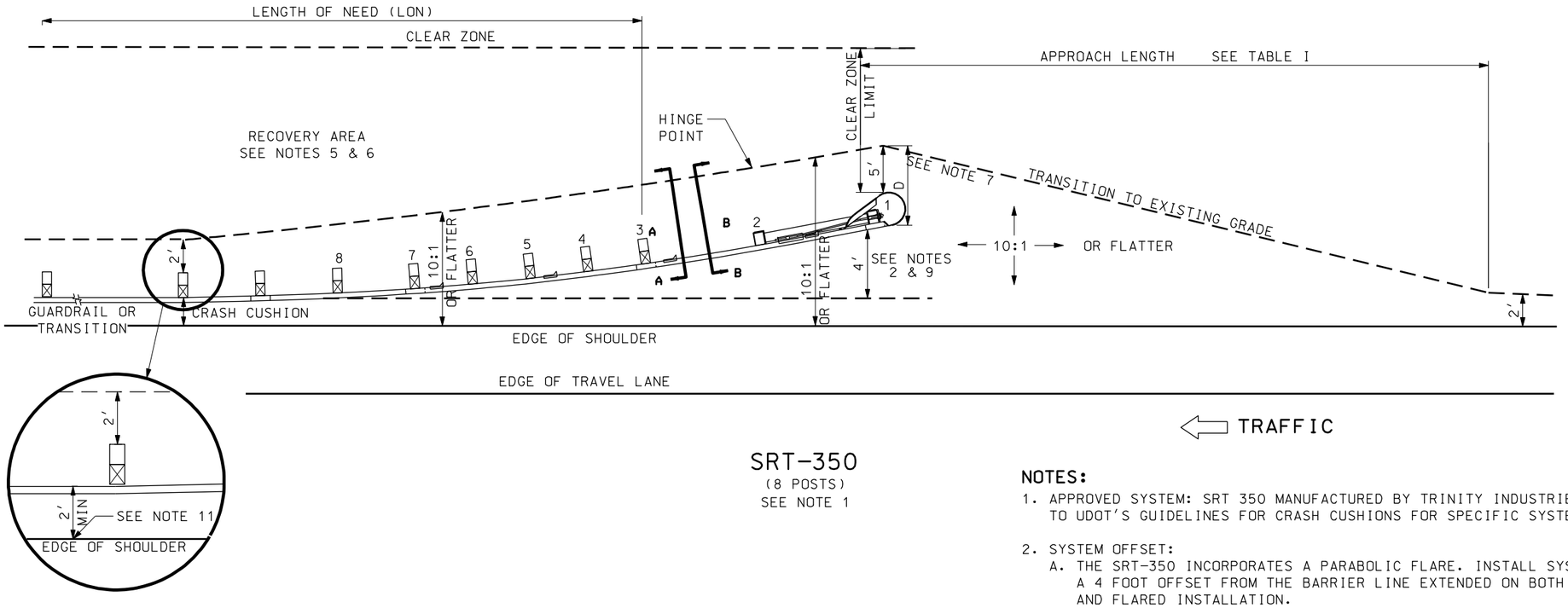
RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

GRADING AND INSTALLATION DETAILS CRASH CUSHION TYPE H

STANDARD DRAWING TITLE

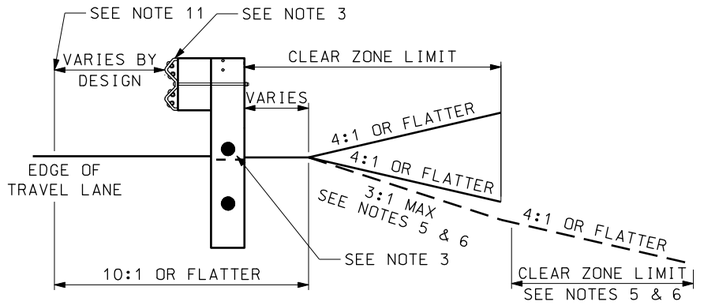
STD DWG
CC 9A

DGN File:L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\xSupp4Approved\CC09a.dgn
02-DEC-2008



SRT-350
(8 POSTS)
SEE NOTE 1

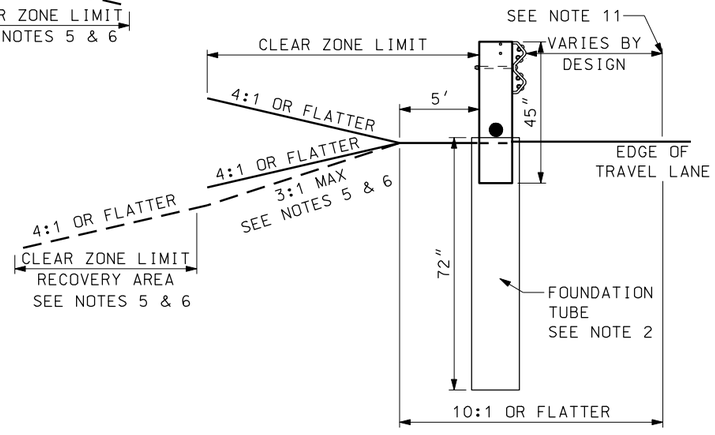
TRAFFIC



TYPICAL SECTION A-A
POSTS 3-8

TABLE 1	
SPEED MPH	**TAPER**
LESS THAN 40	7:1
40 TO 55	10:1
60 TO 75	15:1

D X TAPER= APPROACH LENGTH



TYPICAL SECTION B-B
POSTS 1-2

NOTES:

1. APPROVED SYSTEM: SRT 350 MANUFACTURED BY TRINITY INDUSTRIES REFER TO UDOT'S GUIDELINES FOR CRASH CUSHIONS FOR SPECIFIC SYSTEM DETAILS.

2. SYSTEM OFFSET:
   A. THE SRT-350 INCORPORATES A PARABOLIC FLARE. INSTALL SYSTEM WITH A 4 FOOT OFFSET FROM THE BARRIER LINE EXTENDED ON BOTH A TANGENT AND FLARED INSTALLATION.

3. POST OPTIONS:
   A. WOOD POST ONLY
      1) POSTS 1 AND 2, 45 INCH BREAKAWAY POSTS SET INSIDE 6 FOOT FOUNDATION TUBES. TUBES NO GREATER THAN 4 INCHES ABOVE GROUND.
      2) POSTS 3 THROUGH 8 STANDARD CRT POST. THE BOTTOM OF THE TOP HOLE OF THE CRT POLE IS PLACED AT GROUND LEVEL.

4. USE 12½ FOOT RAIL SECTIONS (3 EACH SECTIONS), SLOTTED AS PER MANUFACTURER'S REQUIREMENTS.

5. COMPLETE SLOPE PREPARATION PRIOR TO INSTALLING SYSTEM.
   A. USE 10:1 OR FLATTER SLOPES IN APPROACH AREA.
   B. USE 4:1 OR FLATTER FORESLOPE OR BACKSLOPE IN THE RECOVERY AREA.
      1) IF A 4:1 FORESLOPE. IN RECOVERY AREA IS IMPRACTICAL USE A MAXIMUM 3:1 FORESLOPE. ESTABLISH A RECOVERY AREA AT THE TOE OF THE 3:1 FORESLOPE OF 4:1 OR FLATTER.
   C. USE A 4:1 BACKSLOPE TO THE CLEAR ZONE LIMIT IN THE RECOVERY AREA. IF A 4:1 CANNOT BE ESTABLISHED A 3:1 IS PERMITTED.

6. CLEAR RECOVERY AND APPROACH AREAS OF ANY FIXED OBJECTS OR HAZARDS.
   A. DO NOT PLACE SIGNS OR POLES IN APPROACH AREA.
   B. USE BREAKAWAY SIGNS OR POLES WHEN PLACED IN RECOVERY AREA. MAINTAIN A MINIMUM 10 FOOT CLEARANCE TO THE SIDES AND REAR OF SYSTEM.

7. CONSTRUCT PLATFORM AS REQUIRED EVEN IF THE PLATFORM EXTENDS BEYOND THE CLEAR ZONE REQUIREMENTS.

8. USE GUARDRAIL TRANSITION, STD DWG BA 4 SERIES, WHEN ATTACHING THE SYSTEM TO CONCRETE BARRIER OR BRIDGE PARAPET.

9. INSTALL REQUIRED MARKINGS AS PER STD DWG CC 1.

10. USE THE CURRENT ROADSIDE DESIGN GUIDE TO ESTABLISH CLEAR ZONE REQUIREMENT AND LENGTH OF NEED (LON) REQUIREMENTS.

11. WHEN ROADWAY DESIGN REQUIRES A 12' OR WIDER EFFECTIVE SHOULDER THE 2' MIN BARRIER OFFSET IS OPTIONAL.

SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	ADDED NOTE 11, REVISION NOTE 6 AND TABLE 1

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

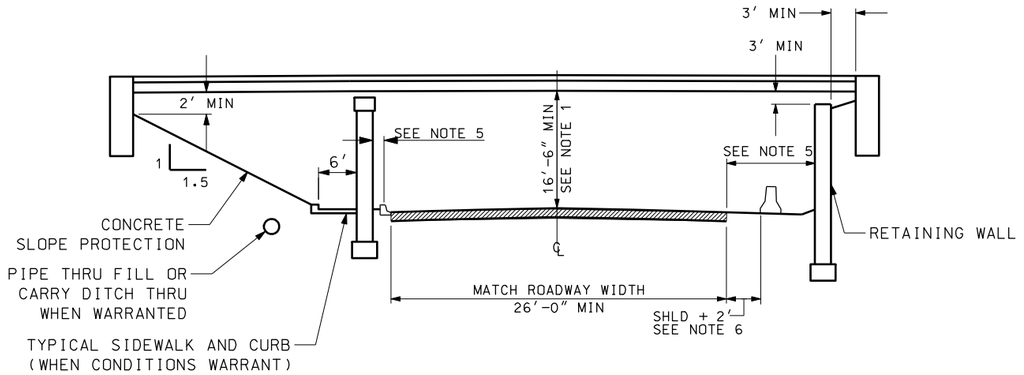
RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

GRADING AND INSTALLATION DETAILS CRASH CUSHION TYPE H (PARABOLIC FLARE)

STANDARD DRAWING TITLE

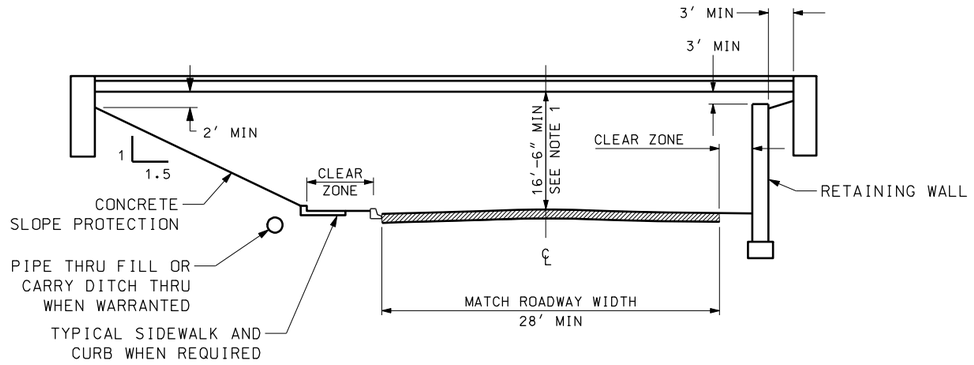
STD DWG
CC 9B

DGN File:L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\x_Supp4Approved\CC09b.dgn
02-DEC-2008



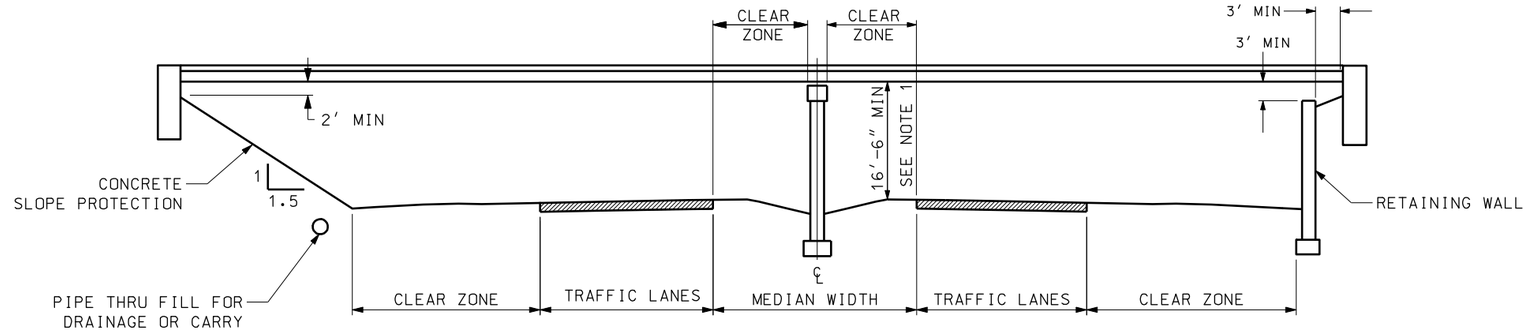
MINIMUM UNDERPASS CLEARANCES

(OTHER THAN FREEWAY OR MAJOR HIGHWAY)



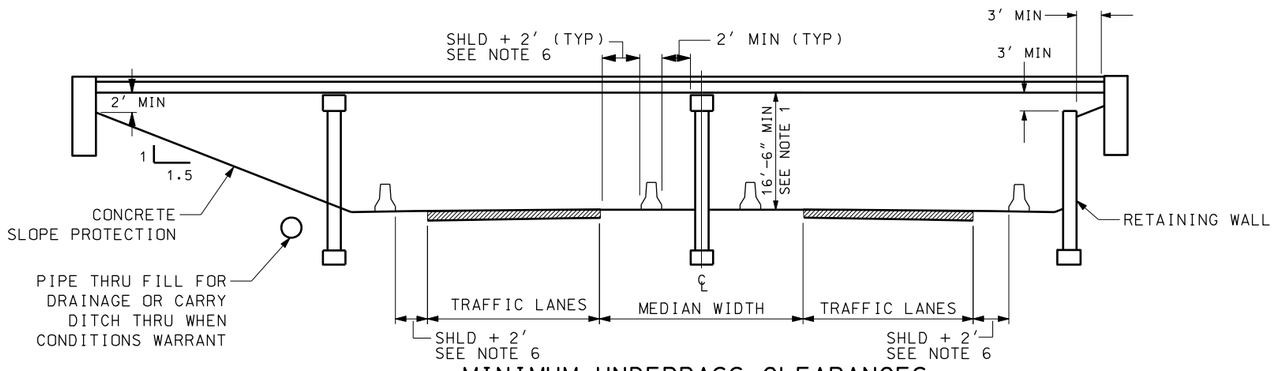
PREFERRED UNDERPASS CLEARANCES

(OTHER THAN FREEWAY OR MAJOR HIGHWAY)



PREFERRED UNDERPASS CLEARANCES

(FREEWAY OR MAJOR HIGHWAY)



MINIMUM UNDERPASS CLEARANCES

(FREEWAY OR MAJOR HIGHWAY)

NOTES:

1. USE A RANGE OF 6″ ALLOWED ABOVE THE MINIMUM CLEARANCE SHOWN EXCEPT WHEN OTHER GEOMETRIC CONSIDERATIONS GOVERN.
2. PROVIDE ADEQUATE PROTECTION FOR OBSTRUCTIONS WITHIN THE CLEAR ZONE.
3. PROVIDE A MINIMUM OF 17′6″ VERTICAL CLEARANCE FOR PEDESTRIAN OVERPASSES AND OVERHEAD SIGN STRUCTURES.
4. USE CURRENT EDITION OF THE AASHTO ROADSIDE DESIGN GUIDE FOR CLEAR ZONE REQUIREMENTS.
5. FOR:
   - 40 MPH AND UNDER
     - USE 4′-0″ MINIMUM WITH CURB
     - USE 1/2 CLEAR ZONE WITHOUT CURB
   - 45 MPH AND ABOVE
     - USE CLEAR ZONE OR BARRIER
6. WHEN ROADWAY DESIGN REQUIRES A 12′ OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL.

SUPPLEMENTAL DRAWING

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	ADDED NOTE 6 AND SEVERAL EDITORIAL UPDATES.

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — OCT.30.2008 DATE

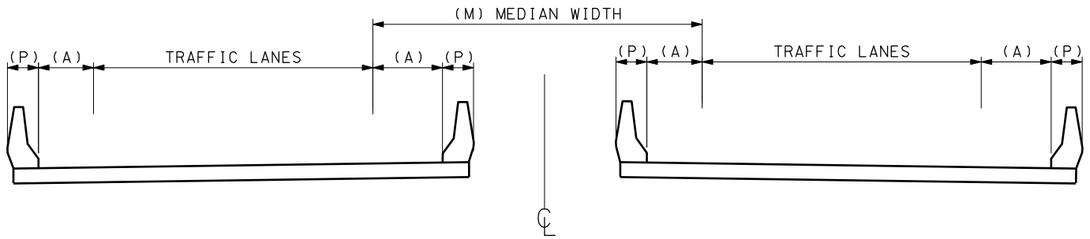
DEPUTY DIRECTOR

STRUCTURAL GEOMETRIC DESIGN STANDARDS FOR CLEARANCES

STANDARD DRAWING TITLE

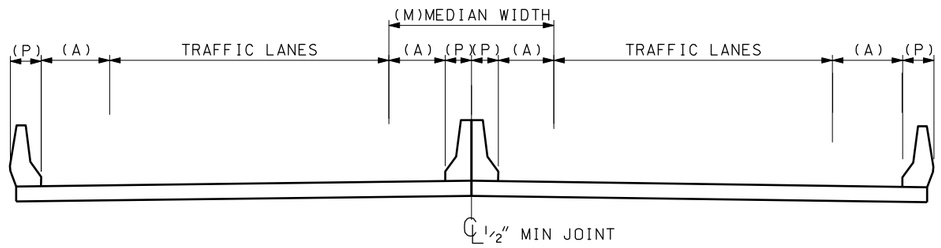
STD DWG

DD 8



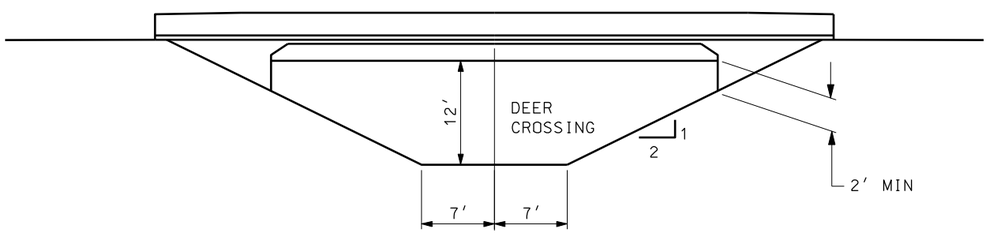
STRUCTURE CROSS SECTION

(OPEN MEDIAN)



STRUCTURE CROSS SECTION

(CLOSED MEDIAN)



DEER CROSSING
(TYP)
NON VEHICULAR

LEGEND

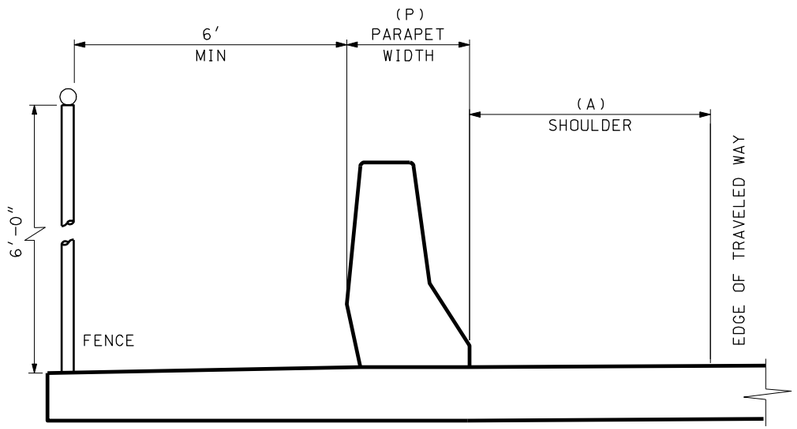
(A) NORMAL SHOULDER PLUS 2'-0" FOR BARRIER OFFSET ON ALL ROADS AND RAMPS.

FOR TWO WAY SINGLE STRUCTURE MATCH ROADWAY WIDTH PLUS 2'-0" BARRIER OFFSET EACH SIDE.

WHEN ROADWAY DESIGN REQUIRES A 12' OR WIDER EFFECTIVE SHOULDER THE 2' MIN BARRIER OFFSET IS OPTIONAL.

(M) WHEN MEDIAN WIDTH IS LESS THAN 30'-0" USE CLOSED MEDIAN STRUCTURE.

(P) PARAPET DIMENSION CONTROLLED BY SPECIFIC DESIGN.



SIDEWALK GEOMETRIC

SUPPLEMENTAL DRAWING

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	MEE	REVISED LEGEND (A)

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE

CHAIRMAN STANDARDS COMMITTEE

APPROVED — OCT.30.2008 DATE

DEPUTY DIRECTOR

STRUCTURAL GEOMETRIC DESIGN STANDARDS

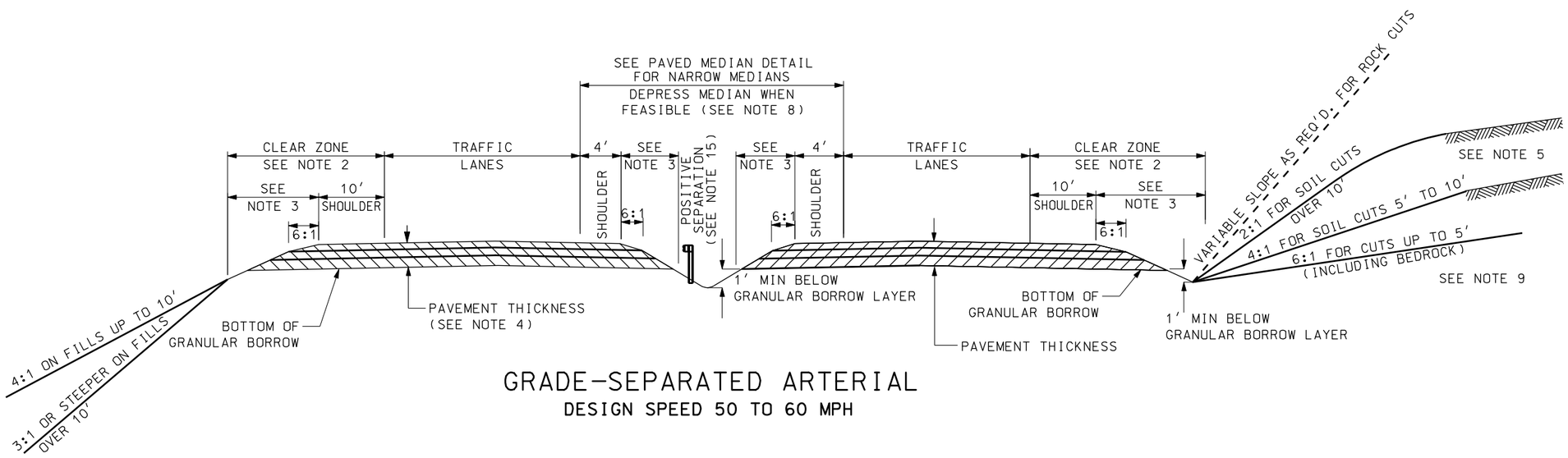
STANDARD DRAWING TITLE

STD DWG

DD 9

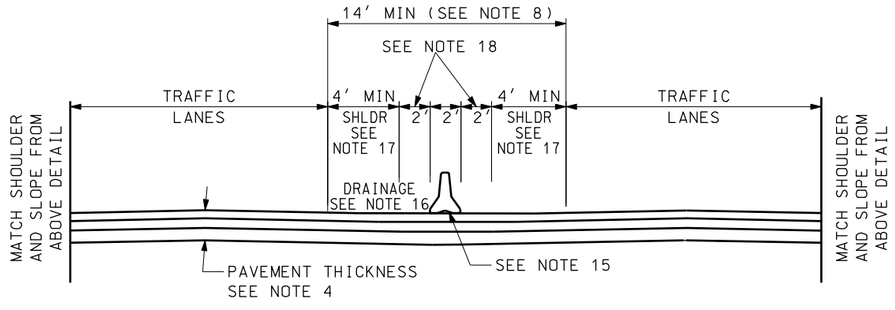
DGN File:L:\Standard_Drawings\Imperial\2008Approved\v_Supplemental_Issues\vSupp4Approved\DD09.dgn

02-DEC-2008



GRADE-SEPARATED ARTERIAL

DESIGN SPEED 50 TO 60 MPH



PAVED MEDIAN DETAIL

NOTES:

1. USE THE CURRENT EDITION OF AASHTO: A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS FOR DESIGN OF ROADWAY ELEMENTS NOT SHOWN ON THIS STANDARD DRAWING.
2. USE THE CURRENT EDITION OF AASHTO ROADSIDE DESIGN GUIDE FOR CLEAR ZONE REQUIREMENTS. CLEAR ZONE MAY EXTEND INTO CUT OR FILL SLOPES.
3. MAINTAIN A 6:1 SLOPE FROM TOP OF PAVEMENT TO TOP OF UTBC. MAINTAIN CLEAR ZONE COMPLIANT SLOPES FROM THE TOP OF THE UTBC TO THE OUTER EDGE OF THE CLEAR ZONE IN FILL CONDITIONS. MAINTAIN A CONSTANT SLOPE FROM THE TOP OF THE UTBC TO THE BOTTOM OF THE GRANULAR BORROW LAYER OR PROVIDE OTHER MEASURES TO DRAIN ALL PAVEMENT THICKNESS LAYERS IN CUT CONDITIONS. MAINTAIN A MINIMUM OF ONE FOOT VERTICAL DISTANCE FROM THE BOTTOM OF THE GRANULAR BORROW LAYER TO THE BOTTOM OF THE CUT DITCH. THERE MAY BE CUT FORESLOPES AND BACKSLOPES IN THE CLEAR ZONE.
4. PAVEMENT THICKNESS CONSISTS OF HARD SURFACING, UTBC, AND GRANULAR BORROW.
5. INSTALL SURFACE DITCH (OPTIONAL) WHEN SHEET FLOW DRAINAGE IS TOWARDS CUT SLOPE. DRAIN SURFACE DITCH TO NATURAL DRAINAGE OR ROADSIDE DITCH. PROVIDE OTHER MEASURES TO PREVENT ERODING CUT SLOPES IF SURFACE DITCH IS OMITTED. SEE STD DWG DD 2 FOR DETAILS. ALSO SEE SLOPE ROUNDING DETAILS IN ROADWAY DESIGN MANUAL OF INSTRUCTION.
6. SEE STD DWG DD 4 FOR TYPICAL DETAILS FOR SECTION ON CURVE AND SECTION ON TANGENT.
7. SEE STD DWG DD 2 FOR TYPICAL SECTION ON DITCH FLARING AND BENCHED SLOPE.
8. USE FLAT PAVED MEDIAN (10:1 OR FLATTER) WHERE MEDIAN IS NOT OF SUFFICIENT WIDTH TO PROVIDE A DEPTH OF 1 FOOT BELOW THE PAVEMENT THICKNESS.
9. THE SLOPES SHOWN FOR CUT AND FILL HEIGHTS ARE SUGGESTED VALUES. SLOPES MAY DEVIATE FROM THESE SUGGESTED VALUES TO MEET PROJECT SPECIFIC REQUIREMENTS.
10. RANGE OF SUPERELEVATION IS THE PAVED WIDTH.
11. USE 2% MINIMUM CROSS SLOPES.
12. PLACE ADVERSE SLOPE BREAKS AT SHOULDER OR LANE LINES IF APPLICABLE.
13. USE 6% MAXIMUM ALGEBRAIC DIFFERENCE FOR SLOPE BREAKS BETWEEN SHOULDER AND LANE LINES.
14. USE 4% MAXIMUM ALGEBRAIC DIFFERENCE FOR SLOPE BREAKS BETWEEN LANE LINES.
15. POSITIVE SEPARATION IS REQUIRED FOR MEDIAN WIDTHS LESS THAN 50′. USE ANY ACCEPTABLE POSITIVE SEPARATION.
16. PROVIDE UNDERGROUND DRAINAGE AT PAVED MEDIAN IF ROADWAYS HAVE A BREAK IN SLOPE THAT DIVERTS WATER TO THE MEDIAN.
17. USE MINIMUM 4′ MEDIAN SHOULDERS (8′ DESIRABLE) FOR UP TO TWO TRAFFIC LANES IN EACH DIRECTION. USE MINIMUM 8′ MEDIAN SHOULDERS FOR THREE OR MORE TRAFFIC LANES.
18. WHEN ROADWAY DESIGN REQUIRES A 12′ OR WIDER EFFECTIVE SHOULDER THE 2′ MIN BARRIER OFFSET IS OPTIONAL.

SUPPLEMENTAL DRAWING

NO.	DATE	APPR.	REMARKS
1	04-24-08	RM	NEW DRAWING
2	10-30-08	MEE	ADDED NOTE 18 AND EDITORIAL UDATES.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

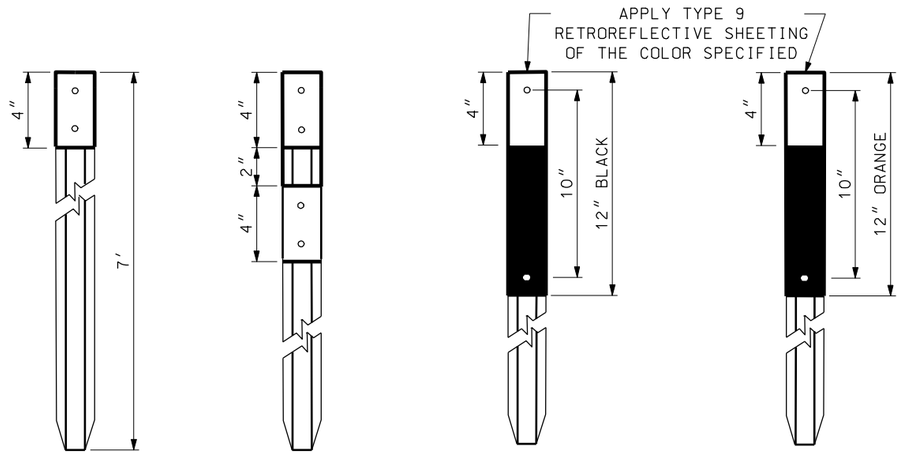
RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

GRADE-SEPARATED ARTERIALS OTHER THAN FREEWAYS 50 TO 60 MPH

STANDARD DRAWING TITLE

STD DWG
DD 17

02-DEC-2008 DGN File: L:\Standard_Drawings\Imperial\2008Approved\v_Supplemental_Issues\vSupp4Approved\DD17.dgn



TYPE I
SINGLE UNIT

TYPE II
DOUBLE UNIT

(OF COLOR SPECIFIED)

SEE NOTE 1

SEE NOTE 1

CULVERT MARKER

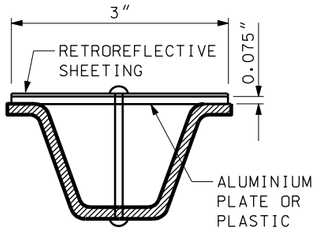
SEE NOTE 2

MAINTENANCE MARKER

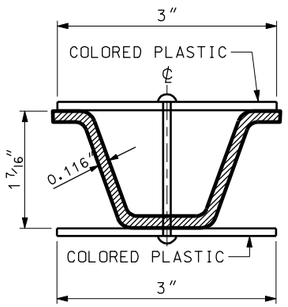
SEE NOTE 2

NOTES:

1. USE GALVANIZED STEEL POSTS FABRICATED WITH $^{5}/_{16}$" HOLES ON 1" SPACING OR FLEXIBLE DELINEATORS AS SPECIFIED IN STANDARD SPECIFICATION 02842. PUNCH HOLES ON THE CENTERLINE OF THE POST. PLACE TOP HOLE 1" FROM THE TOP OF POST. PUNCH HOLES THE FULL LENGTH OF THE POST.
2. ATTACH 3" X 12" X 1/10" COLORED PLASTIC OF THE COLOR SPECIFIED ON CULVERT AND MAINTENANCE MARKERS. USE BLACK ABOVE ORANGE WHEN BOTH MARKERS (MAINTENANCE AND CULVERT) ARE REQUIRED ON ONE DELINEATOR.
3. MOUNT BARRIER REFLECTORS ON CONCRETE AND BRIDGE PARAPETS WITH TWO $^{1}/_{4}$" X $^{1}/_{4}$" METAL HIT ANCHORS.
4. MOUNT BARRIER REFLECTORS ON CONCRETE BARRIER AS SHOWN ON STD DWG BA 1B.
5. MOUNT STRAIGHT REFLECTORS ON WOOD POSTS WITH TWO $2^{1}/_{2}$" ELECTRO GALVANIZED RING SHANK NAILS WITH NEOPRENE WASHERS.
6. MOUNT STRAIGHT REFLECTORS ON STEEL POSTS WITH TWO $^{1}/_{4}$" X $^{3}/_{4}$" BOLTS AND SELF LOCKING NUTS.
7. MOUNT BARRIER REFLECTORS ON GUARDRAIL POSTS AS SHOWN ON STD DWG BA 4A.
8. INSTALL DELINEATOR PLATE ON THE SIDE OF THE POST FACING TRAFFIC. PREFERRED ORIENTATION OF POST TO ONCOMING TRAFFIC IS AS SHOWN. HOWEVER, EXISTING POST WITH THE OPPOSITE ORIENTATION IS ACCEPTABLE. INSTALL ON OPEN FACE SIDE WITH TWO $^{1}/_{4}$" DIAMETER EXPANSION RIVETS (GRIP RANGE $1^{3}/_{8}$" TO $1^{5}/_{8}$"). INSTALL ON OPPOSITE SIDE WITH TWO $^{1}/_{4}$" POP RIVETS WITH BACKING WASHERS.
9. REFER TO STD DWG ST 2 FOR FREEWAY CROSSOVER DELINEATION MARKINGS AND HARDWARE.

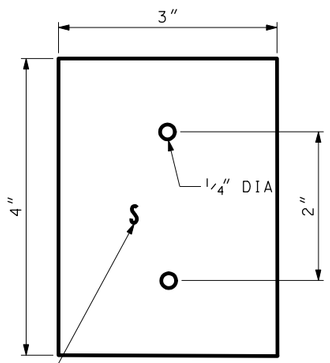


DELINEATOR INSTALLATION
SEE NOTE 8

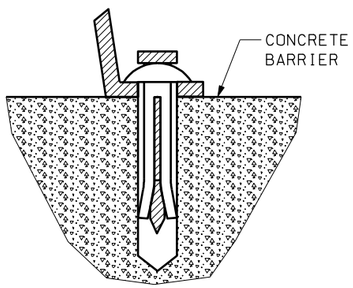


CULVERT/MAINTENANCE MARKER INSTALLATION

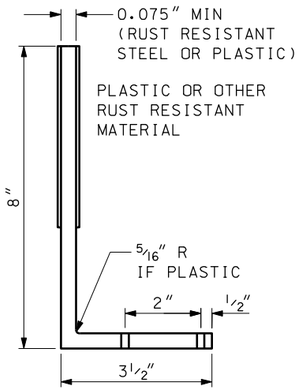
FOR 2 LB/FT POST WITH COLORED PLASTIC ATTACHED. SEE NOTE 2

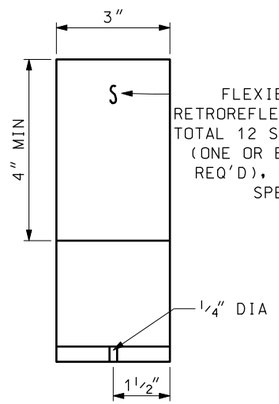


DELINEATOR PLATE
SEE NOTE 8



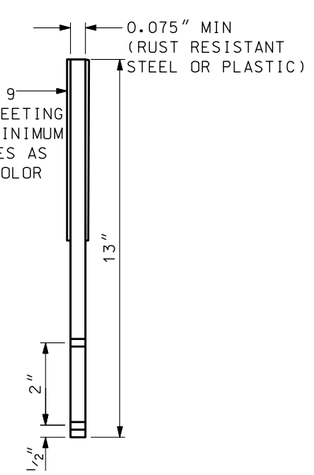
METAL HIT ANCHORS
SEE NOTE 3



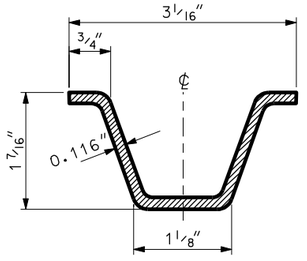


"L" REFLECTOR

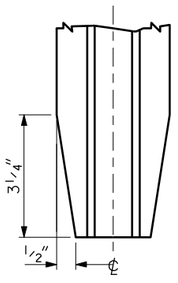
BARRIER REFLECTORS
SEE NOTES 3, 4, 5, 6, 7



STRAIGHT REFLECTOR



CROSS SECTION
FOR 2 LB/FT POST



POST TAPER DETAIL

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10-30-08	BA	NOTE 1 MODIFIED TO ADD FLEXIBLE DELINEATOR REQUIREMENTS.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — OCT.30.2008 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — OCT.30.2008 DATE
DEPUTY DIRECTOR

DELINEATION HARDWARE

STANDARD DRAWING TITLE

STD DWG
GW 9

DGN File:L:\Standard_Drawings\Imperial\2008Approved\x_Supplemental_Issues\xSupp4Approved\GW09.dgn
02-DEC-2008